# FOUNDRY TRADE JOURNAL

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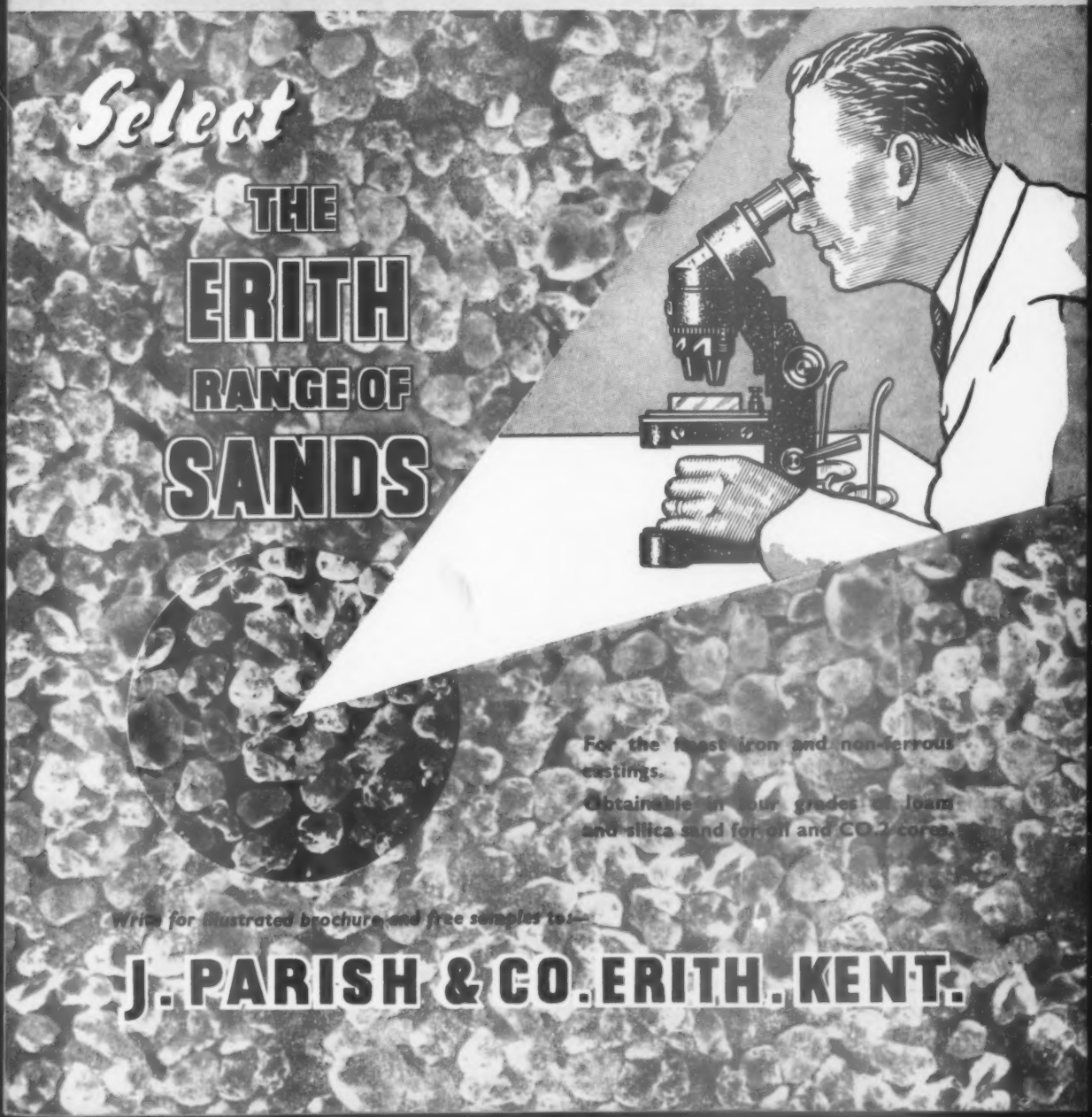
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For the finest iron and non-ferrous castings.
Obtainable in four grades of loam and silica sand for oil and CO2 cores.
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*Solid ribbed hot-rolled steel sections re-inforced externally enable these boxes to resist the roughest usage for the maximum period . . . prolonged if a Shakeout Machine is used.*

Sterling

STERLING FOUNDRY SPECIALTIES LTD., BEDFORD, ENGLAND

Cogent
605

# Every 60 minutes 240 ft of core!

This hand operated machine can also be supplied motorised

**Built for utility** — no risks of sand-clogging.
**Built for strength** — mounted on sturdy, cast-iron base.
**Built for ease of operation** — even by a junior.
The Spermolin Rotary Core Machine puts you a jump ahead with core production facilities.
**LET US SEND YOU FULL DETAILS!**

Four feet a minute—core from ½" to 3". The Spermolin Rotary Core Machine—adaptable, practical, reliable—is right in the forefront with clever self-adjusting, instant acting carrier that eliminates the production of faulty, bent and distorted cores.

Spermolin
*Established over half a century*

## Rotary Core Machines

*The secret of good casting*
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# A *Revolutionary* NEW AIR-SETTING ZIRCON CREAM

**MORE RELIABLE, SAFER, COLD SETTING, BETTER!**

It's a Baltiseed product by William Aske, a new composition which pushes other facing materials into the past. It provides a refractory surface which does not crack, peel, buckle, blister or develop other defects associated with the application of heat and gives an improved skin finish, minimises metal turbulence, lowers fettling costs by putting an end to burning-in, metal wash, etc. Supplied ready for use by painting, dipping, spraying or swabbing.

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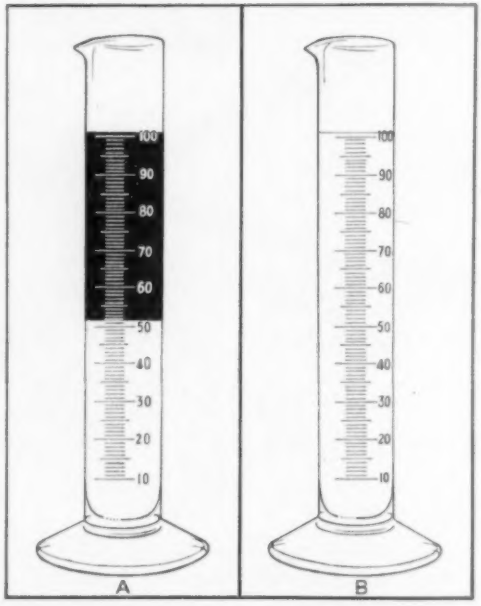
Working samples freely available on request.

*Baltiseed Air-Setting Zircon Cream, as this new refractory coating is called, is patented by William Aske, who have no wish to keep it to themselves and so restrict the free choice of products open to British Foundrymen: they offer the formula to competitors to manufacture under licence, to supply to their own customers under their own brand names.*




Diagrams here illustrated are taken from actual photographs
**Diagram A** shows a conventional competitive Zircon Cream after 2 hours
**Diagram B** shows Baltiseed Air-Setting Zircon Cream after 120 hours

WM Aske & CO LTD

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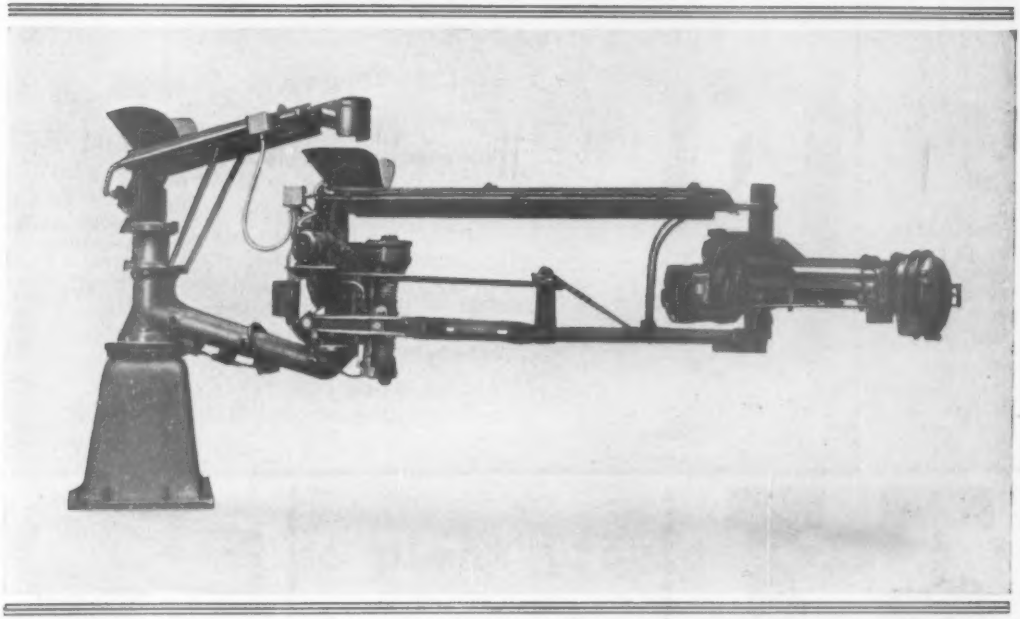
Sandslinger

# AT DURGAPUR



We are privileged to have supplied the SANDSLINGERS to the Iron and Steel Foundry. Illustrated above is the 3 part arm Stationary Type Machine for the production of ingot moulds.

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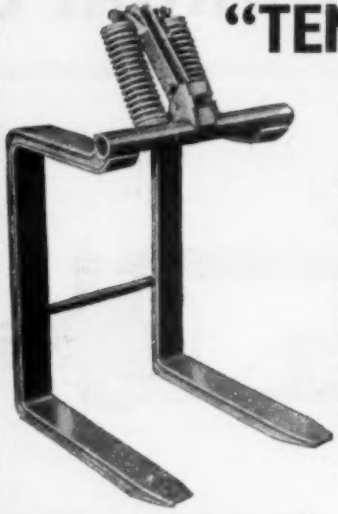

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**A new concept in mechanical handling which replaces chains and 'C' frames. Can be used in gangways too narrow for fork-lift trucks—this means an increase of storage space of up to 50 per cent.**

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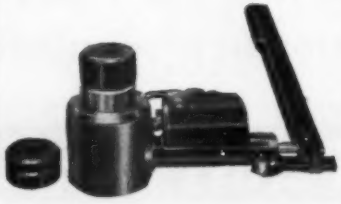

**TRAVELLING CHAIN BLOCKS**

Blocks built-in to Travelling Trolleys, giving reduced head - room. Capacities from 1 ton to 20 tons.

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*Illustration (reproduced by courtesy of Messrs. BILSTON FOUNDRIES Ltd.) is similar to the one described below*

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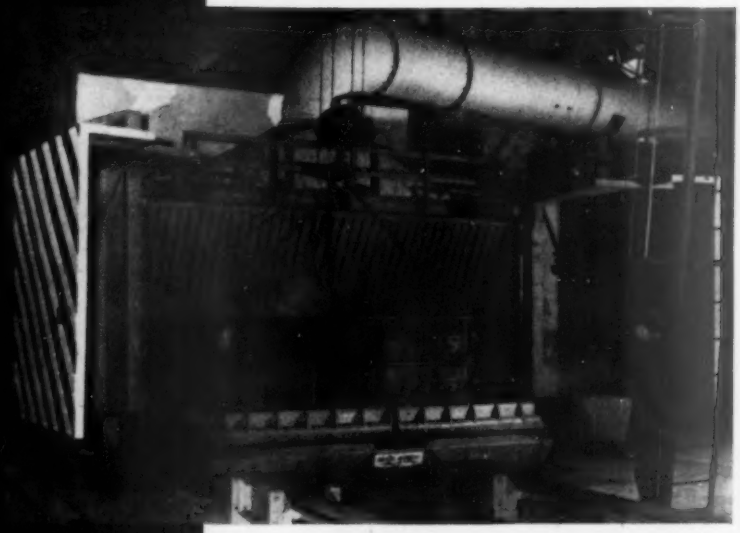
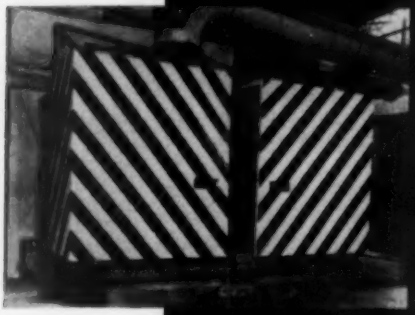
for dust collection and control



*The photographs show the doors in both the open and closed positions.*



An interesting feature of the Holmes-Schneible Multi-Wash installation in the steel foundry of English Steel Castings Corporation Limited are the hydro-pneumatically operated doors enclosing the shake-out hood. These doors which were designed in co-operation with English Steel Castings Corporation Limited, have been very successful in operation and have resulted in a considerable saving of exhaust volume necessary at the shake-out position. The installation is completed by two size 138 type 'JC' collectors, a dewatering tank, hoods on the sand preparation plant, fan and ducting.

***For full details write for a copy of Publication No. 80/23***

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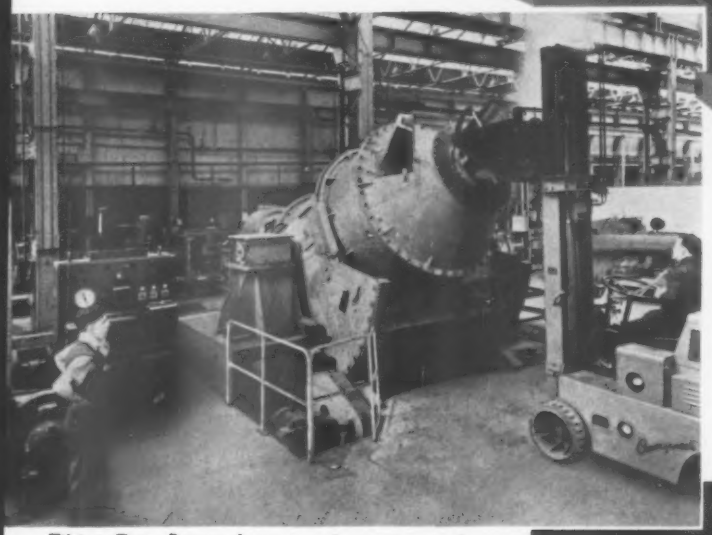
## FOR MALLEABLE IRONS

AT LOWEST PRODUCTION COST PER TON



Tilting Type Rotary furnace reduces time and labour for charging. The furnace may be tilted to a vertical position for relining.

**Furnace Capacities up to 10 Tons.**

**AUTOMATIC COMBUSTION CONTROL EQUIPMENT:** THIS HIGHLY DEVELOPED SYSTEM CONTROLS OIL AND AIR BY WEIGHT AND AUTOMATICALLY COMPENSATES FOR DIFFERENCES IN BAROMETRIC PRESSURE AND TEMPERATURE THUS ENABLING ANALYSES TO BE ACCURATELY FORECAST AND MAINTAINED WITH MELTING LOSSES REDUCED TO AN ABSOLUTE MINIMUM.

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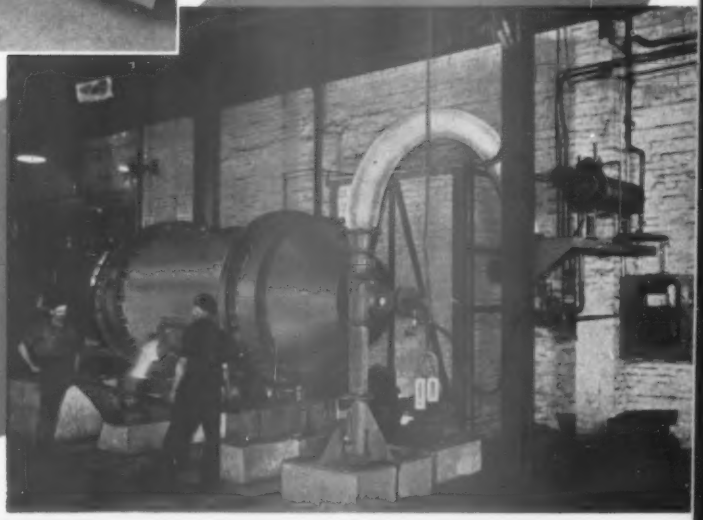
- Ability to superheat to very high temperatures.
- Rapid melting.
- Flexibility of production.
- Simplicity of operation.
- High thermal efficiency.
- Minimum Maintenance and Labour.



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# LOW ALLOY STEEL PRODUCTION IN ELECTRIC FURNACES

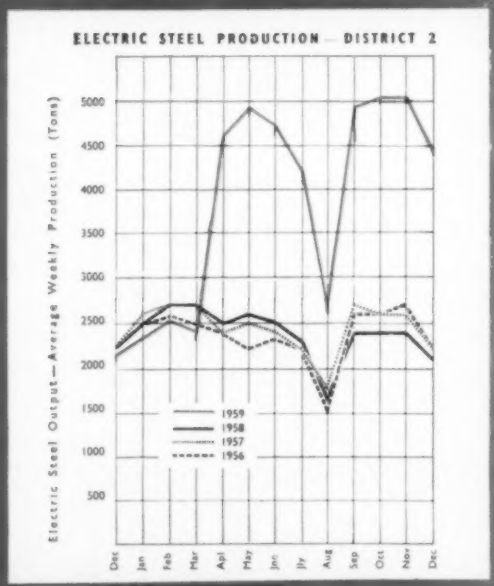
## Official statistics show increase in output of tonnage electric steel

*At Brymbo Steel Works Limited hot metal from a pre-refining vessel is transferred to the arc furnace where it is added to a partly molten charge of steel scrap.*

**No. 2. Brymbo Steel Works Limited**

By the adoption of an oxygen pre-refining method, electric arc furnaces are used to produce special carbon and low alloy steel from hot blast furnace metal at Brymbo Steel Works Limited, Wrexham. Replacing a battery of four open-hearths, three 16 ft. Birlec arc furnaces, each rated at 12,500 kVA, have been commissioned since April 1959. The required output is obtained by operating two furnaces, with one standing ready, in conjunction with previously installed electric melting plant. The striking effect of the new furnaces on electric steel production for the district can be seen from the adjacent graph. The figures, which are taken from official statistics published jointly by the Iron & Steel Board and the British Iron & Steel Federation between 1956 and 1959, relate to output for Denbighshire, Flintshire, Cheshire and parts of Lancashire and Yorkshire.

Whereas electric furnaces had previously been used in this country for steel production from cold scrap, the Brymbo installation is the first to employ hot blast furnace metal.

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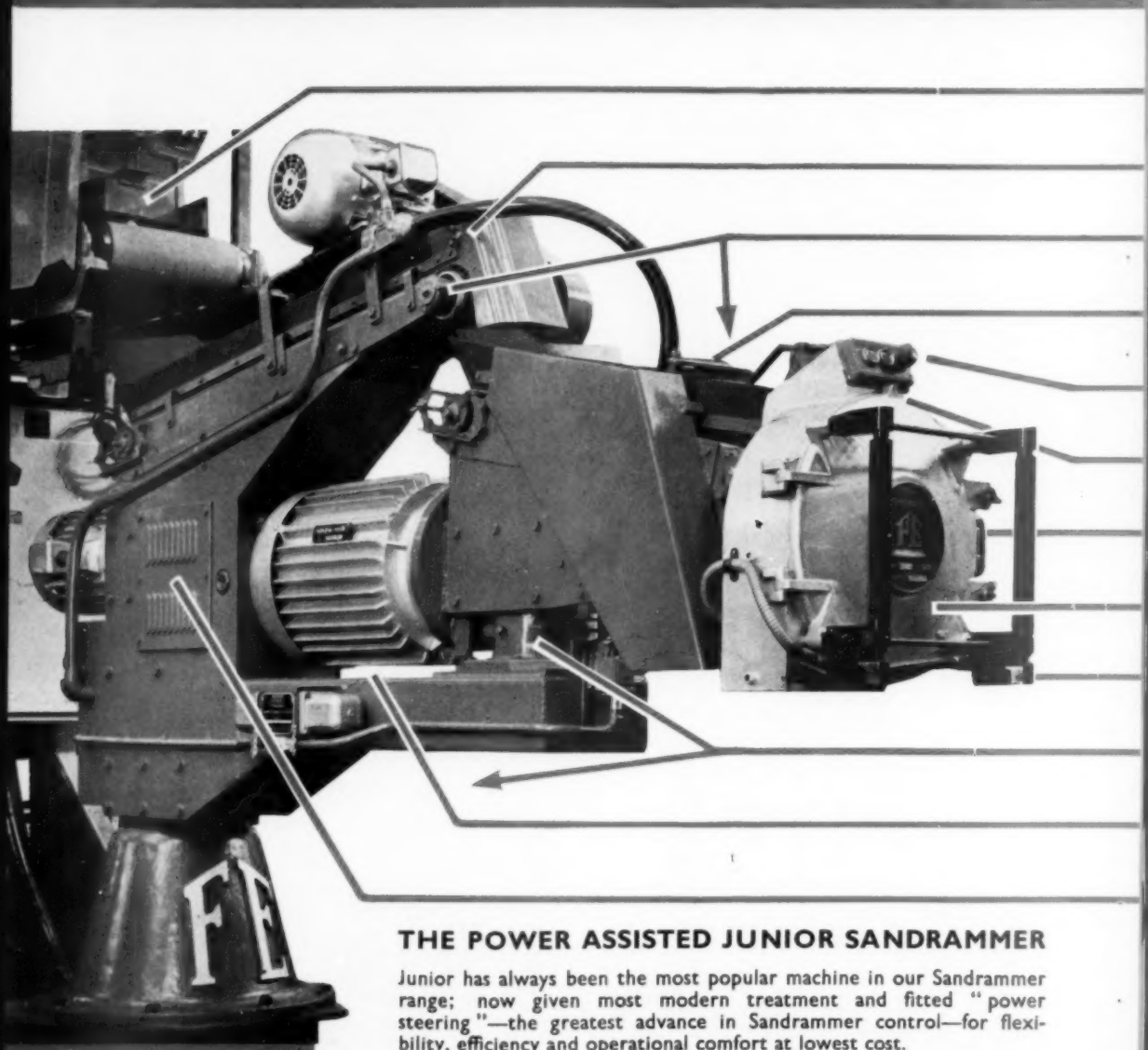


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All Sandrammers now available with Power Assisted Arms as optional refinement (Major fitted pneumatic powered single reciprocating arm as standard feature). 1960 introductions also feature bigger, more powerful Sandrammers up to 24in. Head and 22ft. arm radius.
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# POWER ASSISTED!

Pneumatic gate on feed hopper and belt for continuous regulated sand delivery.

Permanent magnet—quick release fixing for rapid cleaning.

All belts driven at head drum—no belt whip, no spillage.

By-pass plough and chute with handy Head control for unrammed sand delivery—ideal for flat pattern work or to supply floor moulders.

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Push-button pneumatic panel for feed hopper gate control.

18in. diameter Head containing World Patented, Twin Bladed Impellor (adjustable for wear)—maximum output 600 lbs. per minute.

"POWER STEERING" TWIST-GRIP HANDLES—EFFORTLESS CONTROLLED ARM SWING,

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F. E. Sandrammers are covered by British Patent No's: 663318, 657197, 714063, 714064, 740095 and 742745. Patents granted or pending in other industrial countries throughout the world.

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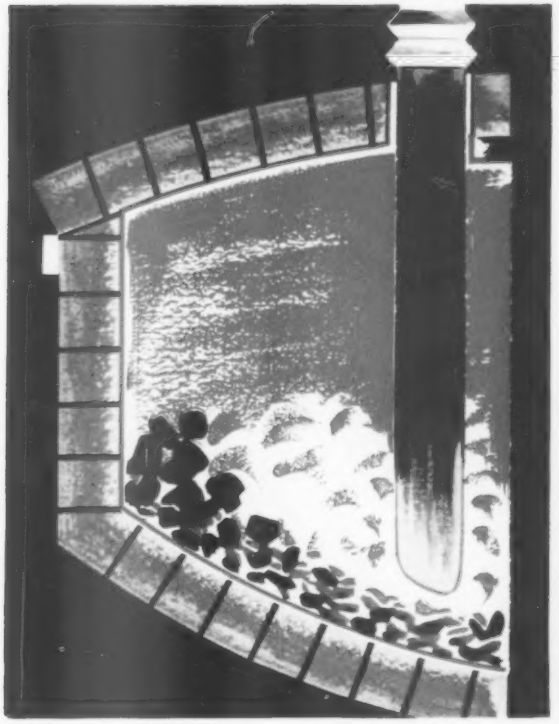

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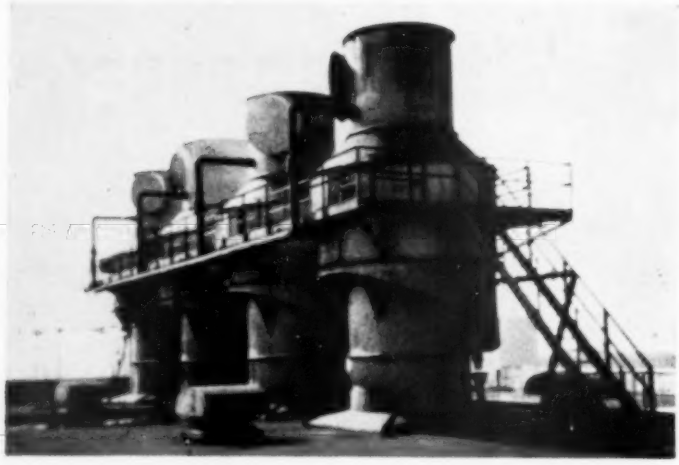

Many Foundrymen think Wet Spark Arresters are a recent development and because of troubles experienced with some installations, usually caused through bad design, they tend to regard them with suspicion.

We are proud that FORD MOTOR CO. selected **TITAN** Wet Spark Arresters for the **4 TITAN** 30 ton per hour Hot Blast Cupolas which we installed in their new Thames Foundry, the most modern in Europe.

These are illustrated, the second Cupola from the left is "blowing" —note the complete absence of dark smoke, sure proof of efficiency.

*Photo completely untouched taken during normal operating conditions.*

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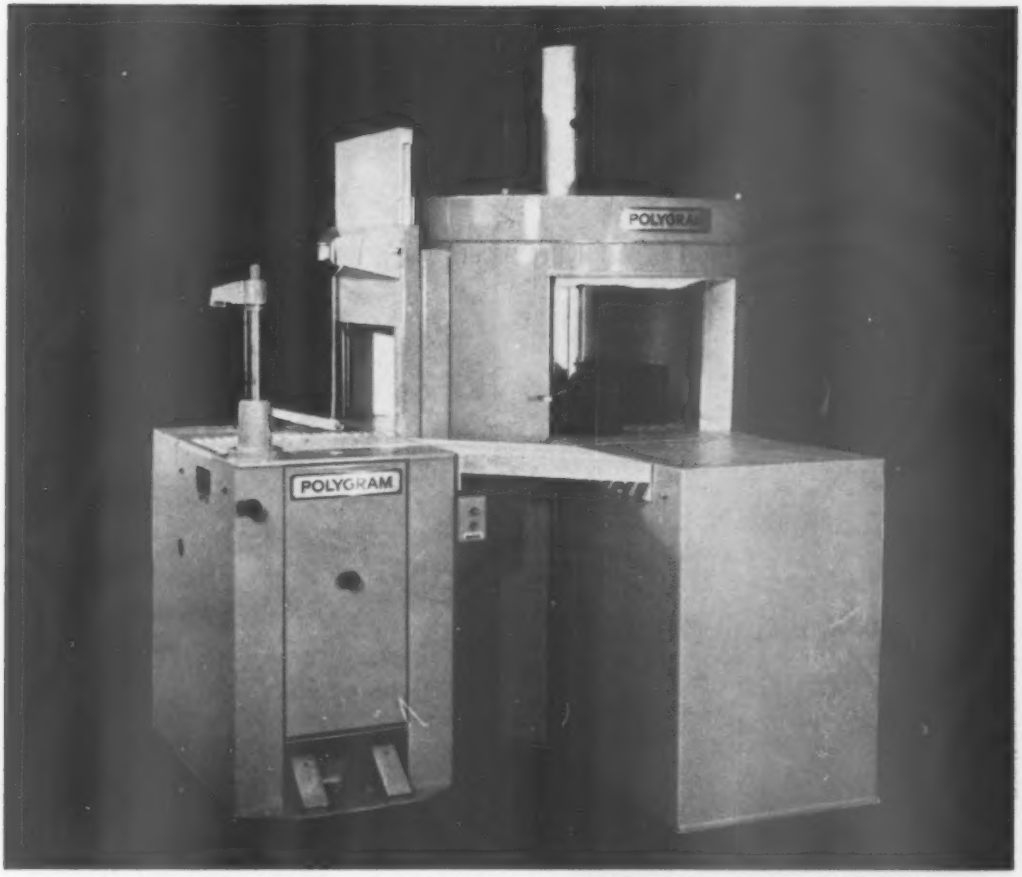
## CMU Shell Coremaker for jobbing foundries




Designed to bring all the economic and technical advantages of shell cores into *your* foundry, the latest Polygram CMU Shell Coremaker is the fruit of 12 years of continuous research by the only British Specialists in Shell Moulding and Coremaking. Note that the unit construction enables you to fit a CMU core blower or oven into your existing layout and to expand it into a full CMU Shell Coremaker at your convenience.

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Designed by Foundrymen—Built by Engineers

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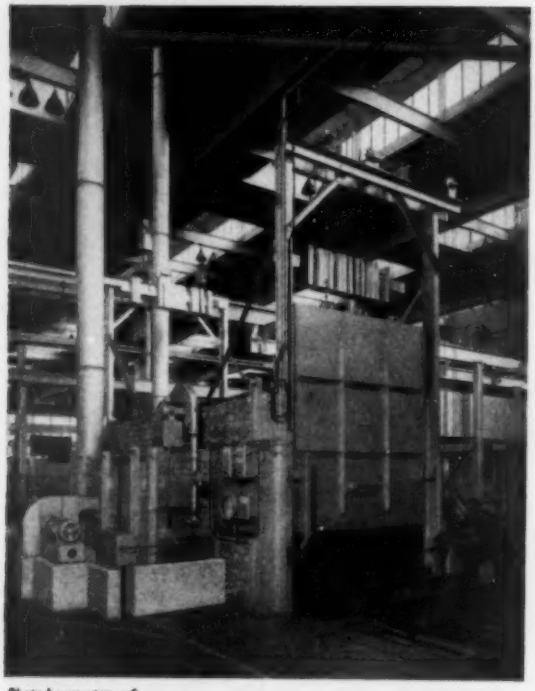

Photo by courtesy of Messrs. W. & T. AVERY LTD.

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**Core and mould drying stoves oil, gas or coke fired with the "NEWSTAD" recirculation system**

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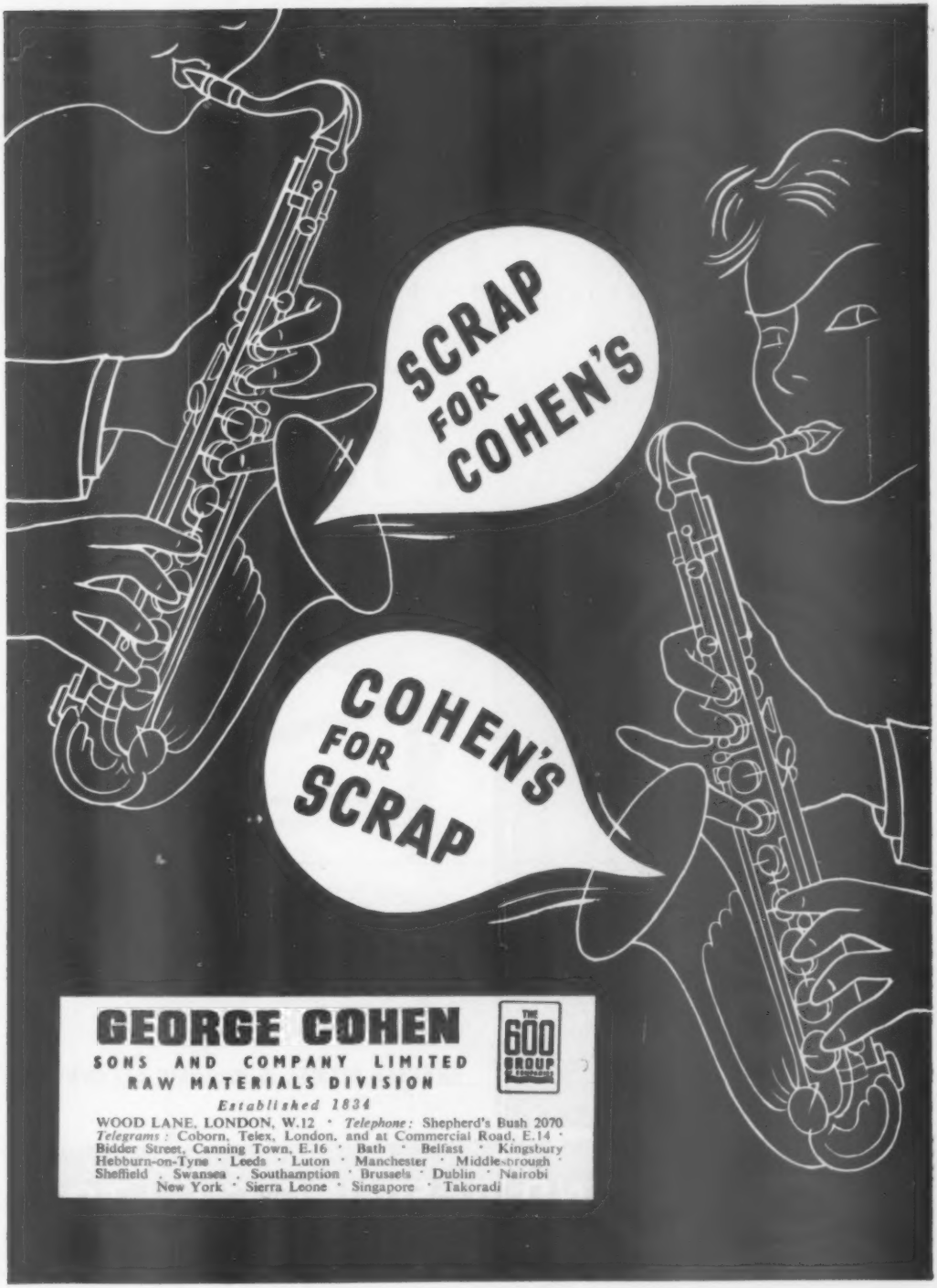
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FOR HIGH DUTY CASTINGS
CHILLED IRONS
FOR CHILLED CASTINGS
REFINED HEMATITES
FOR MALLEABLE CASTINGS

*In 15 ton casts direct*
*from receiver to required analysis*

Castings made from these irons have greater density and toughness. You will have fewer rejections, greater freedom from cracks, breaks and other defects.

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Many progressive foundries throughout the British Isles and abroad are cutting their costs and reducing overheads by employing Clayton Cranes and Hoists fitted with Micro-Speed Units.

These foundries have proved that the Clayton Micro-Speed Unit, with its positive dead slow speeds, is invaluable, especially when handling heavy moulds and cores.

The photograph shows how, with the Clayton Micro-Speed Unit, heavy loads can be controlled with a minimum of effort.

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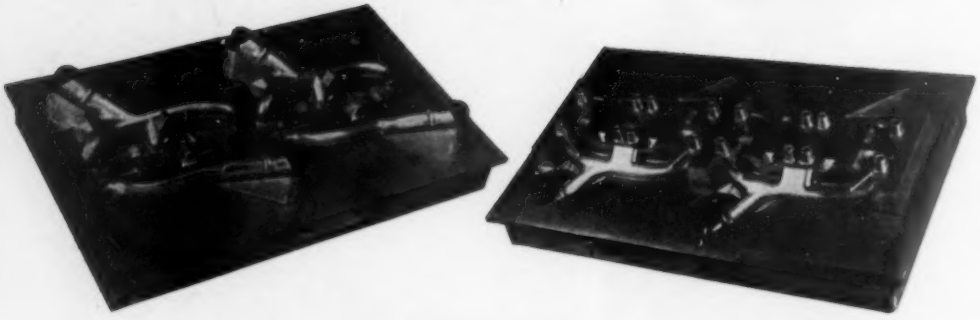

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| | Silicon | 2·0—4·5% (in ranges of ·5%) |
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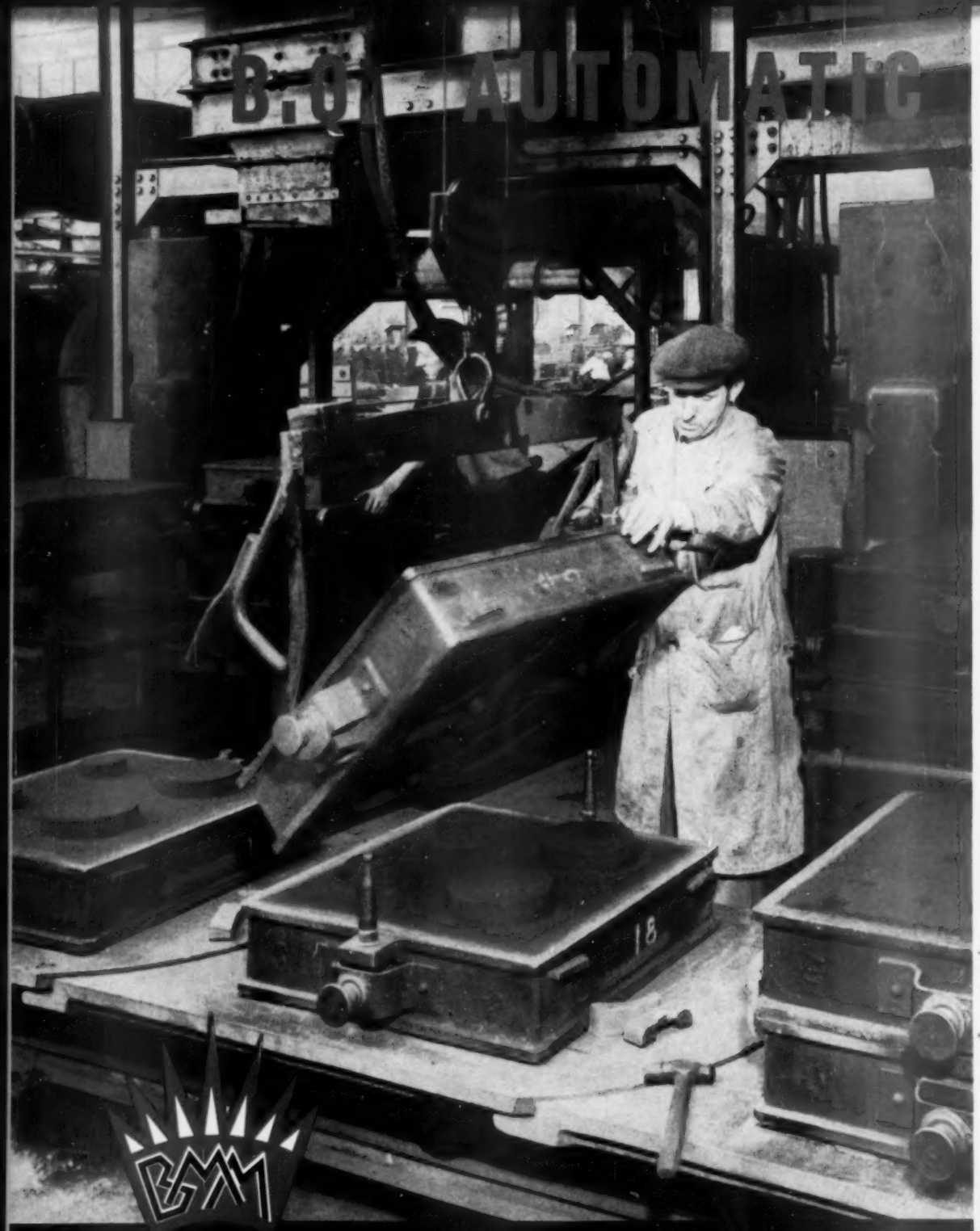


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FURSATIL at 2½% with HB CATALYST is used for the 5 second curing of blown cores: electrically heated core boxes yield cores ready for casting as fast as they can be stripped.

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FURSATIL at 2% with CS CATALYST gives a free-flowing chemically hardening sand with controlled setting times for heavy and complex cores and moulds.

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FURSATIL at less than 1% alone, with or without cereal binders for desired green-bond, can be used for general core production with normal stoving conditions; very low baking cycle times are obtainable by catalyst additions.

**WHAT IS FURSATIL?**
It is a furfurylated amine-aldehyde condensation product, formulated and manufactured solely by Fordath in their West Bromwich plant.

**WHAT ABOUT KNOCK-OUT?**
Breakdown at casting temperatures is good resulting in excellent skin finish on casting in grey-iron and non-ferrous metals.

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★ FURSATIL is a proprietory trade name of The Fordath Engineering Company Limited

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**in two varieties**

**SUPPLIED AS A POWDER FOR MIXING WITH EITHER SPIRIT OR WATER . . . .**

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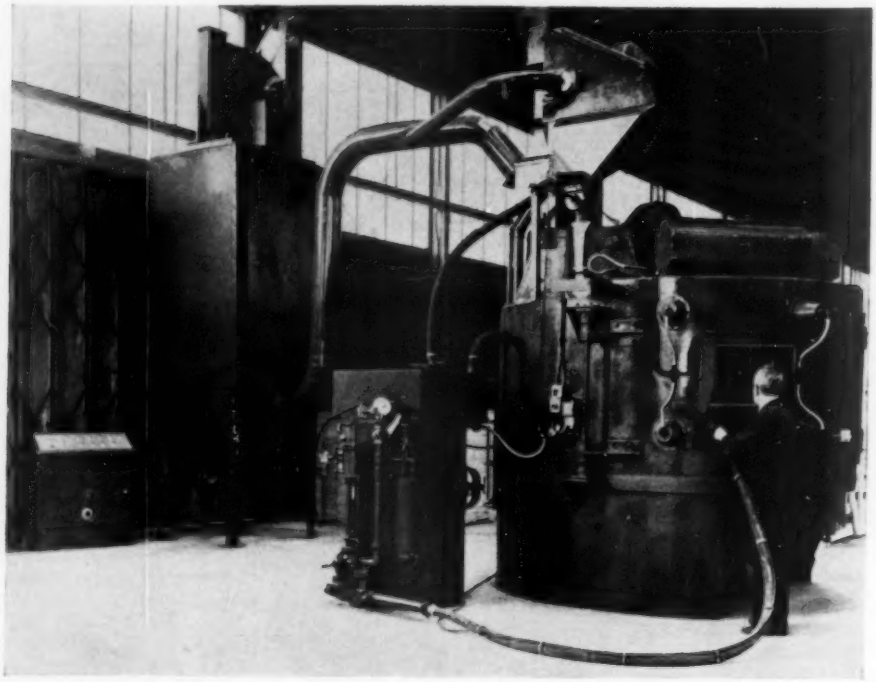

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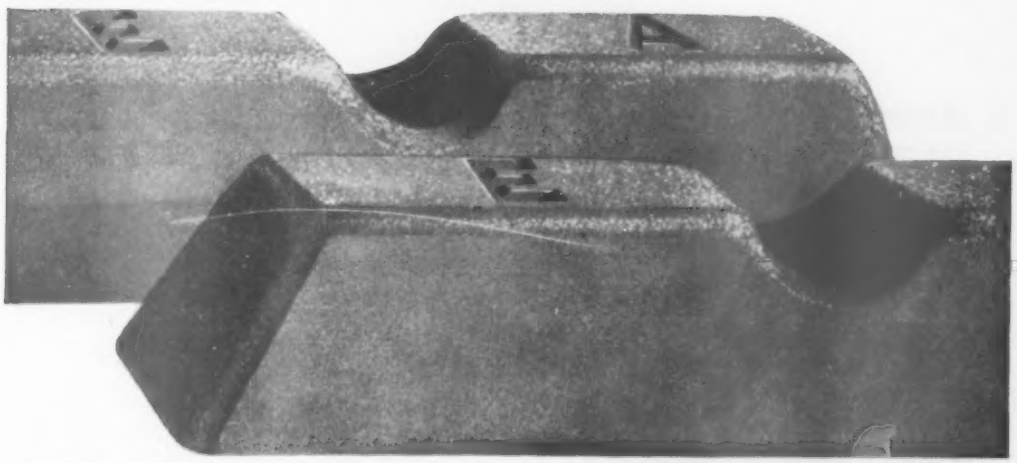

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*LEARN MORE ABOUT THESE VERSATILE BINDERS BY ASKING FOR INFORMATION LEAFLET No. 8*

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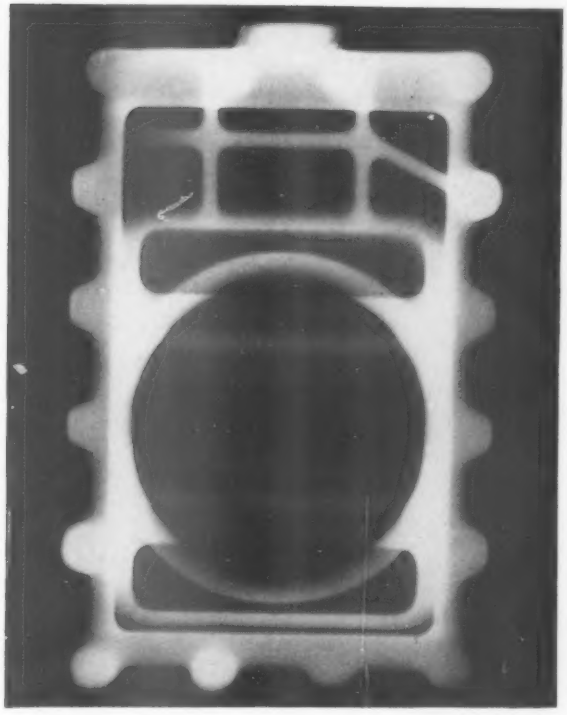

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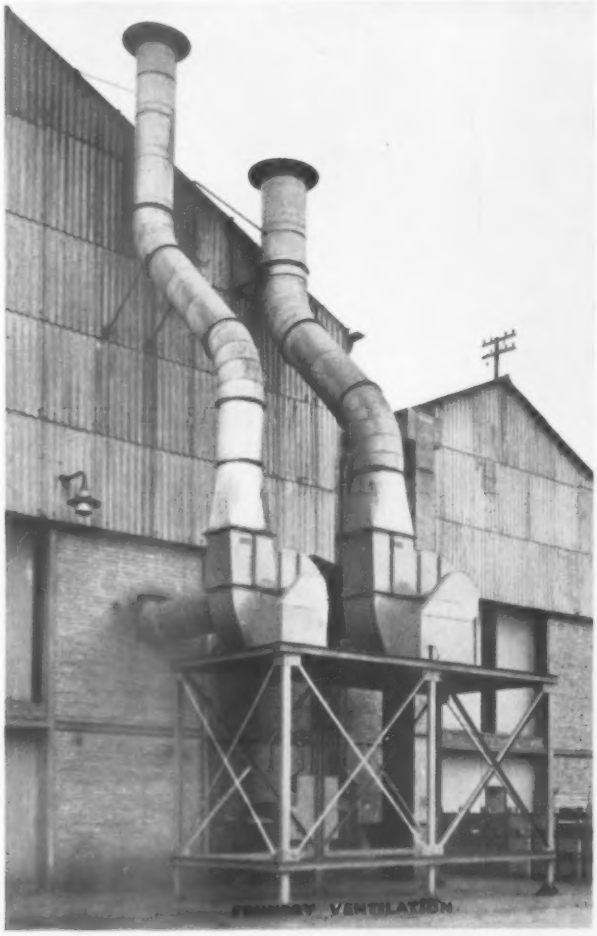

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***The foundry industry of the United Kingdom is represented by the following organizations, many of whose proceedings are regularly reported in this JOURNAL :—***

*Ironfounding Employers' Associations*

## COUNCIL OF IRONFOUNDRY ASSOCIATIONS

*Chairman:* **M. J. Glenny**, Dover Engineering Works, Limited, Talbot House, Arundel St., London, W.C.2. *Director:* **K. Marshall.** *Ass. Director:* **J. W. Butler,** *Secretary:* **D. L. Farrant,** 14, Pall Mall, London, S.W.1. 'Phone: WHitehall 7171. *Participating Associations:* British Cast Iron Research Association (affiliated); Institute of British Foundrymen (affiliated), and the following:—**Association of Automobile and Allied High-duty Ironfounders.** Secretaries, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15. 'Phone: Edgbaston 4141. 'Grams: " Clarify," Birmingham, 15. **British Ironfounders' Association and British Bath Manufacturers' Association.** Director and Secretary: J. Galbraith Sneddon, C.A., 145, St. Vincent Street, Glasgow, C.2. 'Phone: Central 2891. 'Grams: " Groundwork," Glasgow. **British Grit Association** (affiliated).—Secretary: J. Campbell MacGregor, 10, Bank Street, Airdrie, Lanarkshire. **British Malleable Tube Fittings Association.**—Secretary: F. B. Ridgwell, 196, Shaftesbury Avenue, London, W.C.2. 'Phone: TEMple Bar 6052-3. 'Grams: " Brimatufia," London. **Cast-Iron Chair Association.**—Secretaries: Peat, Marwick, Mitchell & Co., The Cast Iron Chair Association, Queen's Square, Middlesbrough, Yorkshire. **Cast Iron Axlebox Association and National Ingot Mould Association.**—Secretaries: Peat, Marwick, Mitchell & Company, 301, GlossopRoad, Sheffield. 'Phone and 'Grams: Broomhill 63031. **Cast Iron Heating Boiler and Radiator Manufacturers' Association.**—Secretary: Stanley Henderson, 69, Cannon Street, London, E.C.4. 'Phone: CITy 4444. **British Cast Iron Pressure Pipe Association.**—Secretary: W. I. Campbell, 14, Pall Mall, London, S.W.1. 'Phone: WHitehall 7941. **Cast Iron Segment Association.**—Secretary: W. Rose, Stanton Ironworks Company, Limited, P.O. Box 3, near Nottingham. **Greensand Pipe Founders' Association.**—Secretaries: McClure Naismith Brodie & Company, 77, St. Vincent Street, Glasgow, C.2. 'Phone: Glasgow 9476. 'Grams: "Lycidasm," Glasgow. **National Association of Malleable Ironfounders.**—Secretary: Miss L. Verity, M.B.E., Chamber of Commerce Offices, Tudor House, Bridge Street, Walsall. 'Phone: Walsall 5671. **National and Midland Ironfounders' Association.**—Secretary: F. W. Sims, 69, Harborne Road, Edgbaston, Birmingham, 15. **Roll Makers Association of Great Britain.**—Secretaries: Peat, Marwick, Mitchell & Company, Beaufort House, Newhall Street, Birmingham, 3. 'Phone: Central 6661-3.

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*Other Employers' Associations:*

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## ASSOCIATION OF BRONZE AND BRASS FOUNDERS

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# PRINCIPAL CONTENTS

PAGE

## Technical Control in Steel Foundries in North America

*By Clyde B. Jenni*

Survey of the whole field of process control in the American steel-founding industry, from raw materials to quality of product. The first section completes the survey so far as metal preparation and melting is concerned .. .. .. .. .. .. .. .. .. 69

## Economy with the $CO_2$ Process

*By D. J. Cousins*

By control of moisture and following a new milling technique, the author describes how reclaimed sand may be employed successfully in the $CO_2$ Process .. .. .. .. .. .. .. .. 79

**Contrôle technique dans les fonderies d'acier en Amérique du Nord. Par Clyde B. Jenni.**
Examen de tout le système de contrôle de procédé dans l'industrie américaine de fonderie d'acier, des matières premières jusqu' à la qualité du produit. La première section de l'examen s'étend jusqu' à la préparation et la fusion du métal. 69

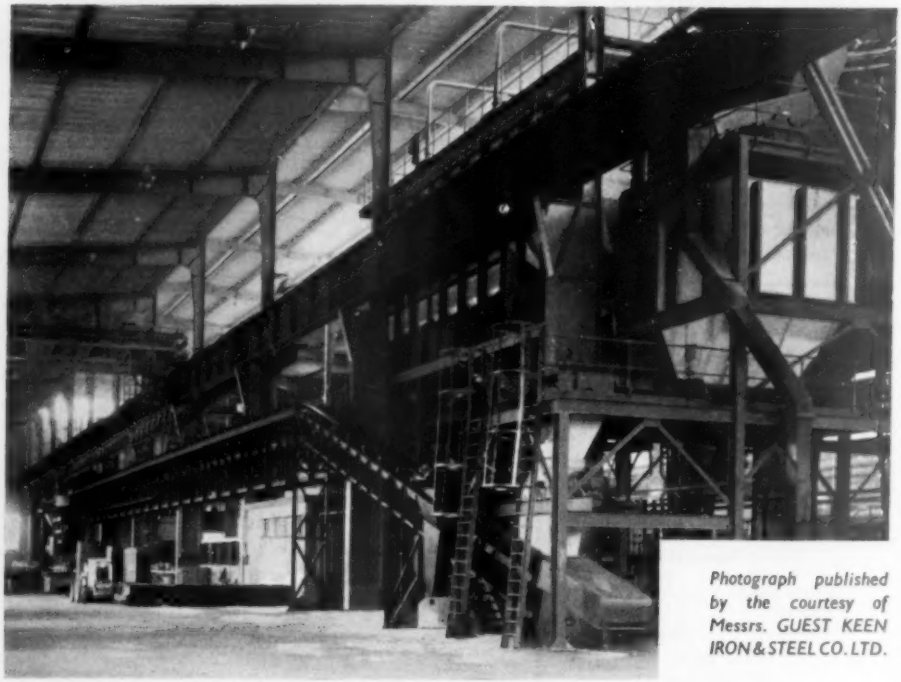
**Economie réalisée avec le procédé au $CO^2$. Par D. J. Cousins.**
L'auteur décrit comment, en contrôlant l'humidité, et en suivant une nouvelle technique de broyage, on peut utiliser avec succès du sable récupéré dans le procédé au $CO^2$. 79

**Technische Überwachung in nordamerikanischen Stahlgiessereien. Von Clyde B. Jenni.**
Eine Übersicht über das Gesamtgebiet der Verfahrensüberwachung in der amerikanischen Stahlgiessereiindustrie, von den Rohstoffen bis zur Güte der Erzeugnisse. Der erste Teil beschliesst die Übersicht soweit sie sich auf Metallvorbereitung und Schmelzen bezieht. 69

**Gute Haushaltung beim Kohlensäure-Erstarrungsverfahren. Von D. J. Cousins.**
Der Verfasser beschreibt, wie durch Feuchtigkeitskontrolle und Anwendung eines neuen Mahlverfahrens, rückgewonnener Formsand erfolgreich für das Kohlensäure-Erstarrungsverfahren verwendet werden kann. 79

*Features, News, Commercial Information and Statistics*

*Leader:* A Case for Action .. .. .. .. .. .. .. 67
*Correspondence:* Cast-iron Cannon .. .. .. .. .. 68
Forty Years Ago .. .. .. .. .. .. .. .. 68
Forthcoming Events .. .. .. .. .. .. .. .. 68
Technological Courses in Michigan .. .. .. .. .. .. 78
Gating Systems .. .. .. .. .. .. .. .. 78
S.I.F. Long-service Brothers .. .. .. .. .. .. 78
Pressure-die-cast Agitators .. .. .. .. .. .. .. 80
Personal .. .. .. .. .. .. .. .. 81
Equipment and Supplies .. .. .. .. .. .. .. 83
Complex Bedplate in Grey Iron .. .. .. .. .. .. 84
Carron Works Dinner .. .. .. .. .. .. .. 84
Non-ferrous Metals Statistics .. .. .. .. .. .. 84
British Display at Delhi Fair .. .. .. .. .. .. 84
Notes from the Branches .. .. .. .. .. .. .. 85
Company News .. .. .. .. .. .. .. .. 86
Translation Service .. .. .. .. .. .. .. .. 86
Craft Training .. .. .. .. .. .. .. .. 87
Law Cases .. .. .. .. .. .. .. .. .. 87
News in Brief .. .. .. .. .. .. .. .. .. 88
Book Reviews .. .. .. .. .. .. .. .. 90
Raw Material Markets .. .. .. .. .. .. .. 94
Current Prices of Iron, Steel and Non-ferrous Metals .. .. .. 96



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COMPLETE FOUNDRY EFFICIENCY

# A LARGE *Ingot Mould Foundry* equipped by

Photograph shows mixed sand vibrating screen, storage hopper with belt feeder, system aerator, and conveyor (with overband magnet), for distribution of prepared sand to a large sand slinger (travelling type).

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FOUNDRY
TRADE JOURNAL

Vol. 110 January 19, 1961 No. 2302

## A Case for Action

It is the considered opinion of members of the Association of Bronze and Brass Founders that the proposed Non-Ferrous Foundry Regulations are extremely onerous and indeed, in some cases, more severe than the corresponding conditions imposed on iron and steel founders. What the opinions are of non-member firms is not known, but having exactly the same interests, it can be presumed they will be similar. The implications as we see them are that should the Regulations be imposed as drafted, the result will be the closing down of many of the smaller concerns. The Ministry of Labour never disclosed how many iron foundries closed their doors as a result of the Iron and Steel Foundries Regulations. Mainly, they were of course only very small concerns, but no doubt provided a useful service to local industries. At one time, legislatively, the country was divided into factories and workshops, each having their own rules and it would be better if these conditions were re-established, as the working conditions in each type of establishment are not comparable.

Under to-day's circumstances, the largest and the smallest concerns all receive the same treatment, but the cost impact of meeting Regulations varies inversely with the size of the concern. The honorary officers of the ABBF are doing their best to have changes made in the draft Regulations to reduce the severity of their impact, but they need, and need badly, the support of the whole of the non-ferrous foundry industry to lend weight to the argument. It would be much more satisfying to the Factory Inspectorate to be certain that all the founders of the country affected by the proposals were solidly behind any objections made and modifications proposed.

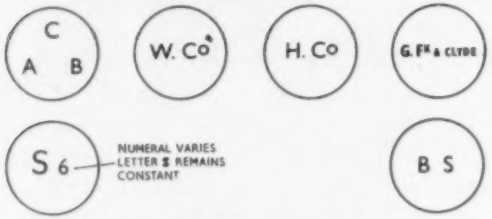
The ABBF are anxious to support in an increasing measure research for the industry and in this, too, the views and desires of the whole industry are desirable if a programme is to be established which will be of maximum value to both large and small firms. In all industries, the tendency is for larger firms to increase in size and for the number of smaller concerns to diminish. Finally, it should be borne in mind that the proposed Regulations cover light-alloy and die-casting founders, and thus there is a wide section of the foundry industry which should rally to the support of the copper-base-alloy castings manufacturers in prosecuting the case with the Ministry. (In case any reader has not the address of the ABBF at hand it is c/o Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15.)

# Correspondence

*To the Editor of the* FOUNDRY TRADE JOURNAL

## CAST-IRON CANNON*

SIR,—I am a member of the R. A. Historical Affairs Committee at Woolwich, and am now engaged into research into the cast-iron cannon founders whose initials, as shown below, appear on trunnions of iron cannon *circa* 1800-1820. Having tried all the usual sources, including the War Office and the Tower of London without avail, I am hoping that you might be kind enough to publish my quest in the next issue of the FOUNDRY TRADE JOURNAL, in the hope that some of your readers might be able to assist.




You may be interested to know that I have traced the fact that BP Co on cannon of same era stands for Bailey Pegg Co. (a firm which is still in existence at Brierley Hill, Staffs, and at 81, Bankside, London, S.E.)—Yours, etc.,

J. G. D. ELVIN,
(Late Maj.)

"Sallyport,"
2 Midways,
Stubbington, Hants.

* Readers who enter into correspondence direct with Major Elvin are requested to send copies to the JOURNAL so that the curiosity of other readers may be satisfied—EDITOR.

## Forty Years Ago

In 1921 the JOURNAL changed from a monthly to a weekly publication, thus it is intended in future "Forty Years Ago" reviews to comment on the aggregate issues (four or five weeks as the case may be) making up the month's complement of journals—for example the following comment applies to JOURNALS dated January 6, 13, 20 and 27, 1921. In the month under review there was appointed a new Editor, Mr. V. C. Faulkner, who previously had been a pioneer in the development of electric steel melting. In retrospect, it appears that this fact coloured some of the JOURNAL items of the period to the extent that over-emphasis was given to this, then, comparatively new method of producing molten steel for founders. It is of interest to learn that in January, 1921, the name of the Research Association for the Ironfoundry Industry was changed to the British Cast Iron Research Association. The four issues of the month carry a good mixture of practical metallurgical articles, and one by the late Dr. Rosenhain on "Aluminium and its Alloys" is outstanding, even by to-day's standards.

THE SECRETARY of the West Riding of Yorkshire branch of the Institute informs members that, unfortunately, Mr. L. Ramsden is unable to give a lecture at the meeting on February 11, and instead Dr. G. J. Shaw will present a paper entitled "Recent Trends in Cupola Developments."

# Forthcoming Events

JANUARY 24

**Combustion Engineering Association**

*North-western region:* "Heating and Ventilation Problems," by J. B. Atherton, 2.30 p.m., at the Engineers' Club, Albert Square, Manchester.

**Institution of Production Engineers**

*Loughborough College's student section:* "The Toolmaking Industry," by F. O. Harrison, 7.30 p.m., in Room A1, Schofield Building, Loughborough College of Technology.

**Institution of Plant Engineers**

*South Wales branch:* "Industrial Flooring," by E. Davison, 7.30 p.m., at the South Wales Engineers' Institute, Park Place, Cardiff.

JANUARY 25

**Manchester Metallurgical Society**

"The X-ray Microanalyser as a Research Tool for the Metallurgist," by D. A. Melford, 6.30 p.m., at the Manchester Literary and Philosophical Society, George Street, Manchester.

**Institute of British Foundrymen**

*London branch:* "Developments in the Production of Gunmetal Castings," by F. Hudson, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.
*Birmingham branch:* "Mechanized Foundry for the Weekly Production of 250 tons of Blackheart-malleable Castings," by G. Lamb, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

**Combustion Engineering Association**

*Midland region:* Discussion on "Effective Use of Gas in Industry," to be opened by A. C. Jennings, 10.30 a.m., at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham.

**Institution of Production Engineers**

"World's Future Transport requirements," the 1961 Lord Sempill paper, to be delivered by Sir Percy Hunting, 6.30 p.m., in the Lecture Theatre of the Royal Aeronautical Society, 4, Hamilton Place, London, W.1.

JANUARY 26

**West of England Metallurgical Society**

"Recent Developments in Metallography," by Prof. R. W. K. Honeycombe, 7.30 p.m., at the College of Technology, Ashley Down, Bristol 7.

**Institute of British Foundrymen**

*Wales & Monmouth branch:* "Non-ferrous Alloys Containing Tin," by Dr. Prytherch, 7 p.m., in Newport.
*Northampton section:* "Work of the British Cast Iron Research Association," by H. Morrogh, 7.30 p.m., at the Plough Hotel, Northampton.

JANUARY 27

**Institution of Production Engineers**

*Derby section:* "Manufacture of a Motor-car," by G. Irvin, 7 p.m., in the Louis Room, St. James Restaurant, Derby.

**Institute of British Foundrymen**

*Falkirk section:* "Work-study in the Foundry," by A. A. Timmins, 7.30 p.m., at the Temperance Cafe, Lint Riggs.

## GEC Expansion Plans

The company is aiming to "reform itself on modern lines," and a number of plans for expansion will be announced in the near future, said Mr. Arnold Lindley, newly-appointed chairman of the General Electric Company, Limited, last week. At present, he said, both the heavy engineering industry, which accounted for 25 per cent. of GEC's business, and light engineering, including domestic appliances, which absorbed the remaining 75 per cent., were in the doldrums, but on the latter side there was scope for development. On the heavy side he was less optimistic; developments were more likely to be in the direction of mechanical engineering than of electrical.

# Technical Control in Steel Foundries in North America*

*By Clyde B. Jenni*

**This paper was the exchange lecture under the British Steel Castings Research Association's reciprocal scheme with the Steel Founders' Society of America, and can be looked upon as almost a textbook on American steelfoundry control methods. In the introduction to his paper, the Author deals with the complex structure of the steel-casting industry in the US and Canada, dealing, in passing, with the classification of foundries, casting processes used, and technical controls exercised. The paper is divided into nine main sections dealing with steelmaking (raw materials, charges, melting and chemistry controls, chemical laboratory, slag control, deoxidation, temperature control, and pouring); foundry practices (raw materials, moulding, coremaking, shakeout and sand reclamation); cleaning-room practices; heat-treatment (furnace equipment, temperature control, furnace loading, heat-treatment cycle and liquid quenching); welding (removal of defects, weld repair, electrodes, preheating, post-welding heat-treatment, and weld inspection); inspection; quality control; foundry planning. The final section is devoted to safety and dust control, where the Author stresses the necessity of good-housekeeping, both as an adjunct to good and safe working-conditions and as a means of having a better working environment. (This first instalment takes the account as far as the end of the section devoted to steelmaking).**

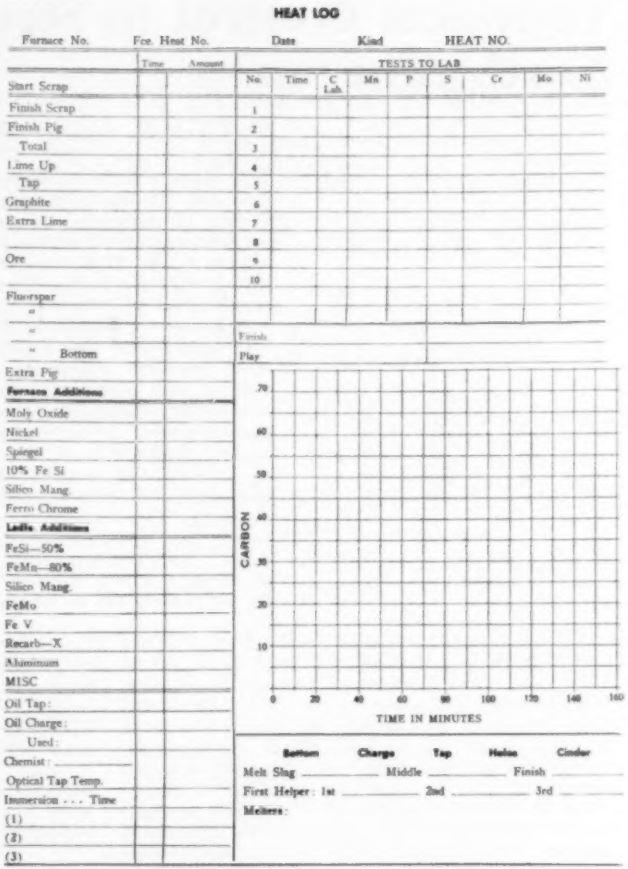
The steel-casting industry in the United States and Canada is a complex structure made up of nearly 200 steel foundries. These are widely distributed among 40 states in the United States and eight provinces in Canada. As there is a wide variation in the size of these plants and organizations, there is also a wide variation in the size and complexity of the castings produced. Castings range in size from fractions of an ounce to upwards of 300 tons in weight, with section thicknesses ranging from fractions of an inch to several feet. Castings nearly 100 ft. in length have been produced.

From a commercial standpoint, steel foundries are classified as jobbing foundries, where miscellaneous castings of all types, and often in small quantities, are produced; speciality foundries, where a specialized line of castings (such as railway castings), are generally produced in large quantities; and captive foundries, where castings for the company's own use are produced. Steel castings produced fall in two general classes, carbon and low-alloy steel castings, and high-alloy steel castings. The latter class contains over 8 per cent. of alloying elements and includes heat- and corrosion-resistant steels and austenitic manganese-steel.

Steel foundries are frequently classified in accordance with the steelmaking process employed, that is, electric-arc, open-hearth, and induction melting. A further, and frequently used, classification is based upon the type of furnace lining and slag employed, *i.e.*, acid or basic electric, and acid or basic open-hearth. Originally, most steel foundries used the acid open-hearth process; later, the basic open-hearth process, developed by the wrought-steel industry, came into steelfoundry use. The advent of the acid electric process proved to be a versatile tool to the steelfoundry industry and a wide diversification of product and geographical location resulted. The basic electric process was

FIG. 1.—*Arrangement for preheating the material in a charging box on an open-hearth floor. Note the gas burner on top of the improvized oven.*

* This Paper was presented at the Harrogate Conference of the British Steel Castings Research Association. The Author is director of research and chief metallurgist, General Steel Castings Corporation, Eddystone, Pa.



HEAT LOG

Furnace No. Fce. Heat No. Date Kind HEAT NO.

| | Time | Amount |
|---|---|---|
| Start Scrap | | |
| Finish Scrap | | |
| Finish Pig | | |
| Total | | |
| Lime Up | | |
| Tap | | |
| Graphite | | |
| Extra Lime | | |
| | | |
| Ore | | |
| | | |
| Fluorspar | | |
| " | | |
| " | | |
| " Bottom | | |
| Extra Pig | | |
| **Furnace Additions** | | |
| Moly Oxide | | |
| Nickel | | |
| Spiegel | | |
| 10% Fe Si | | |
| Silico Mang. | | |
| Ferro Chrome | | |
| **Ladle Additions** | | |
| FeSi—50% | | |
| FeMn—80% | | |
| Silico Mang. | | |
| FeMo | | |
| Fe V | | |
| Recarb—X | | |
| Aluminum | | |
| MISC | | |
| Oil Tap: | | |
| Oil Charge: | | |
| Used: | | |
| Chemist: | | |
| Optical Tap Temp. | | |
| Immersion . . . Time | | |
| (1) | | |
| (2) | | |
| (3) | | |

TESTS TO LAB

| No. | Time | C Lab. | Mn | P | S | Cr | Mo | Ni |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| Finish | | | | | | | | |
| Play | | | | | | | | |



Bottom Charge Tap Helos Cinder

Melt Slag _____ Middle _____ Finish _____

First Helper: 1st _____ 2nd _____ 3rd _____

Melters:

FIG. 2.—*Type of form used as a "heat" log in an open-hearth plant. Space is provided for recording progress of the melt starting with the charge, furnace additions, ladle additions, temperature readings, history of preliminary samples and results. A graph of the carbon content during the progress of the melt is also included in the record.*

first utilized in the foundry industry for specialized work, such as the making of Hadfield manganese-steel, but it has come into prominence in many areas. Induction melting is increasing in importance with larger capacity furnaces being brought into use. This versatile tool is becoming increasingly important for stainless steel, high-alloy steels, and specialized products. The newer melting methods, such as vacuum melting, consumable-electrode melting, zone melting, etc., are being used for specialized products.

### A Complex Industry

The industry is also complex in the casting processes used. While silica sand continues to be the primary moulding-medium, other materials are finding usage. There is a wide spectrum in moulding methods, ranging from greensand and dry-sand moulding to ceramic moulding, investment moulding and the use of semi-permanent moulds, such as graphite. Shell moulds and cores, $CO_2$-moulds and cores, and the use of quick-setting or chemical binders are achieving prominence and add to the complexity of the industry. Advances have been made in centrifugal casting, pressure pouring, the use of electric hot tops (electrically-heated feeder-heads) exothermic materials, and external chilling practices. In spite of the complexity of the industry, there are many items in the operation of steel foundries which are relatively common to all. Thus, it is possible to discuss the subject of technical controls in a meaningful manner as it reflects the broad cross-section of US practices and experience.

Technical controls are exercised to a greater or lesser degree by all steel foundries. The very existence of a foundry is dependent upon these controls. Better methods of process control offer the best assurance of maintaining and further improving the quality of steel castings. Greater economy is achieved through the reduction and elimination of defective material and scrap, and this can only be accomplished by the proper exercise of control methods. The best methods generally consist of careful policing of specified manufacturing procedures. Every detail of manufacture, from the raw materials used to the finished product, must be carefully studied. Many organizations find it useful to prepare these procedures and record them in a manual. No changes in the methods of manufacture, specifications or raw materials used are then permitted by any individual without the approval of those responsible. Such changes should be made on a temporary basis or by a revision of the procedure.

The responsibility for exercising process-controls varies considerably among different organizations. In general, however, the final degree and effectiveness of control rests with the works manager or chief operating officer. He must clearly define the policies covering the scope of the programme. He, too, must give support to those who implement the programme and carry it into execution in the operations of the various departments of the plant. In some organizations, the metallurgical department is given wide authority covering all aspects of technical control, with the possible exception of foundry planning. In other plants, each department is responsible for its control programme with

GENERAL STEEL CASTINGS CORPORATION

**HEAT REPORT**

FURNACE NO. _____ PURN. HEAT NO. _____ DATE _____ HEAT NO. _____

| MATERIAL | TIME | WEIGHT | % |
|---|---|---|---|
| CHARGE | | | |
| PIG IRON | | | |
| PIG IRON | | | |
| SHOP _____ ALLOY | | | |
| SHOP _____ | | | |
| BAIL SCRAP | | | |
| NO. 1 HEAVY SCRAP | | | |
| NO. 2 SCRAP | | | |
| TURNINGS | | | |
| TOTAL CHARGE | | | 100% |
| ADDITIONS—FURNACE | | | |
| GRAPHITE | | | |
| IRON ORE—10% OF CHARGE | | | |
| PIG IRON—EXTRA | | | |
| SPIEGEL | | | |
| FERRO SILICON—17% | | | |
| SILICO MANGANESE | | | |
| FERRO CHROME HI. CARBON | | | |
| NICKEL | | | |
| MOLYBDIC OXIDE | | | |
| FERRO CHROME LOW CARBON | | | |
| ADDITIONS—LADLE | | | |
| FERRO SILICON—50% | | | |
| SILICO—MANGANESE | | | |
| FERRO MANGANESE | | | |
| FERRO MOLYBDENUM | | | |
| ALUMINUM | | | |
| COAL—RECARB | | | |
| TOTAL WEIGHT OF HEAT | | | |
| TOTAL WEIGHT 0% LOSS | | | |
| SUNDRIES | | | |
| LIME | | | |
| LIME—EXTRA | | | |
| IRON ORE—10% OF CHARGE | | | |
| FLUORSPAR | | | |
| MAGGOLITE | | | |
| BASIPRIT | | | |
| CHROME ORE | | | |
| DOLOMITE | | | |
| OXYGEN CONSUMPTION | | | CU. FT. GAL. TON |
| METER READING—STOP | | | |
| METER READING—START | | | |
| CU. FT. GAS USED GAL. OIL | | | |
| GAS OIL TO DATE | | CU. FT. GAL. | PER TON |

START CHARGING

FINISHED CHARGING

TIME OF CHARGE

TIME METAL MELTED

MELTING TIME

CHARGED BY

FINAL ADDITIONS

TIME TAPPED

TOTAL TIME OF HEAT

DELAY ON TAPPING

CAUSE OF DELAY

TAPPING TEMPERATURE _____ POUR

FURNACE WORKING

NO. OF HEATS NOW ADDY

GAS OR OIL LADLE _____ DRY

GAS OR OIL LADLE _____ POUR

SIZE OF NOZZLE

MAKE OF NOZZLE _____ HEAD

WEIGHT OF SCULLS

LADLE NO.

TIME REQUIRED REPAIR BOTTOM

TIME—IDLE SCHEDULE

LADLE HELD

REMARKS

IMMERSION—No. —TIME—TEMP.—DEPTH

(1)

(2)

MELTER

FOREMAN

CHEMICAL ANALYSIS

| KIND TEST | C. | MN. | SI. | P. | S. | NI. | CR. | MO. | V. |
|---|---|---|---|---|---|---|---|---|---|
| HEAT TEST | | | | | | | | | |
| TIME | | | | | | | | | |
| 1. PEEL | | | | | | | | | |
| 2. PEEL | | | | | | | | | |
| 3. PEEL | | | | | | | | | |
| 4. PEEL | | | | | | | | | |
| 5. PEEL | | | | | | | | | |
| | | | | | | | | | |
| HALL TEST | | | | | | | | | |
| Finish "B" | | | | | | | | | |
| "C" | | | | | | | | | |
| CHEMIST | | | | | | | | | |
| METALLURGIST | | | | | | | | | |

FIG. 3.—*Form used in the same open-hearth plant as in Fig. 2, on which the time of addition of materials and their weight, fuel consumption, charging time, melting time, total time of melting, tapping delays and tapping temperatures, refractory data, ladle-drying data, nozzle size used, skull formation and repairs carried out are all recorded.*

the metallurgical group acting as a service department. In some cases, a formalized programme, together with an organizational chart, is delineated; in other cases, control is carried out in an informal manner, with each department head being responsible for the work in his department.

The most effective approach, particularly in the larger organizations, is the use of the line and staff method. Production problems, supervision of labour, etc., are carried out by the "line officers," in this case, the foreman and general foreman. The technical control for the operations is in the hands of "staff officers," which may be the metallurgical group, planning group, segments of the inspection group, sand technician, etc.

## STEELMAKING

### Raw Materials

Control in steelmaking begins with the raw materials. These are purchased to specification requirements and the incoming materials are inspected prior to acceptance. Chemical analyses of pig-iron, purchased scrap, and ferro-alloys are generally performed. In some cases, particularly the ferro-alloys, the material is accepted upon the supplier's certification. The acid-steel producers control the sulphur and phosphorus content of their purchased scrap and, in many instances, the residual alloy-content is also limited. Sizing of the raw materials and their cleanness receive much attention. Dry storage of ferro-alloys is practised by many. The use of dry materials is receiving much attention, particularly those using burnt lime. In some cases, the lime is purchased in triple bags, and one foundry is purchasing it in polyethylene vapour - barrier bags. Many foundries using bagged lime do not take it from partially-used bags. In all cases, the users of burnt lime are most careful to employ fresh, dry material.

Some ferro - alloy additions, which are added just prior to tapping a melt, are preheated. Fig. 1 shows an arrangement whereby the material in a charging box is preheated in an improvised heating-arrangement. The stand is located between two open-hearth furnaces and is accessible to the charging car. The weighed material in the charging box is placed on the stand, the cover containing the gas burner is lowered over the pan and the material is dried.

Open-hearth producers using fuel oil purchase the oil on specifications, with special emphasis on the control of sulphur. In recent years, the sulphur content of the residual oils (Bunker C) from the refineries has been rising. In the past, a sulphur content of 0.75 per cent. has been used as a maximum value, but currently the maximum value is 1.00 per cent. Fuel oils with a lower-sulphur guarantee are obtainable, but carry an extra charge. In the case of furnace refractories, the purchase on specifications and the checking of incoming material for compliance is the exception rather than the rule. Refractories are usually purchased by

FIG. 4.—*Similar type of form used for electric-furnace operations.*

D-196 CSCC 6-59 CS

**ELECTRIC FURNACE HEAT SHEET**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FURNACE NO. | | | | HEAT NO. | | | | GRADE: | | | |
| DATE: | | | | HEAT TIME: | | | | SIZE: | | | |
| METALLIC CHARGE | | | | OPERATION | | | | VOLT CHANGE | | | |
| TIME | MATERIAL | LOT NO. | WEIGHT | PREV. TAP | | | | TIME | VOLTS | | |
| | PURCH. SCRAP | | | POWER ON | | | | | | | |
| | SHOP SCRAP | | | ST. RECHARGE | | | | | | | |
| | SCRAP | | | FIN. RECHARGE | | | | | | | |
| | SCRAP | | | COKE STARTED | | | | | | | |
| | SCRAP | | | TIME MELTED | | | | | | | |
| | FE – MN | | | TAP TIME | | | | | | | |
| | SI – MN | | | KWH USED | | | | | | | |
| | FE – CR | | | ELECTRODES | | | | | | | |
| | NICKEL | | | NO. | TIME | REMARKS | | | | | |
| | MOLY. | | | 1 | | | | | | | |
| | | | | 2 | | | | | | | |
| | | | | 3 | | | | | | | |
| | LADLE FE – SI | | | REFRACTORIES | | | | | | | |
| | ALUM. | | | MATERIAL | | GRADE & REMARKS | | QUANTITY | | | |
| | SI – MN | | | BOTTOM COND. | | | | | | | |
| | | | | WALL COND. | | | | | | | |
| | | | | ROOF COND. | | | | | | | |
| TOTAL METALLIC CHARGE | | | | GENERAL REMARKS | | | | | | | |
| MELTING LOSS | | | | LADLE SIZE | | | NO. HEATS | | | | |
| NET METAL POURED | | | | TRANS. TEMP. | | START | | FINISH | | | |
| FLUXES | | | | DELAYS: | | | | | | | |
| TIME | MATERIAL | CHARGE | DUR. HEAT | TOTAL | | | | | | | |
| | ORE | | | CASTINGS POURED | | | | | | | |
| | LIME | | | NO. | PATTERN NO. | | CUSTOMER | | | | |
| | SPAR | | | | | | | | | | |
| | COKE DUST | | | | | | | | | | |
| | OXYGEN | | | | | | | | | | |
| TOTAL NON-METALLIC CHARGE | | | | | | | | | | | |
| TAP TEMP. | | SKIML TIME | | | | | | | | | |
| HOLD TIME | | HOT TOP ON | | | | | | | | | |
| POUR TEMP. | | HOT TOP OFF | | | | | | | | | |

| | TIME | C | MN | SI | S | P | CR | NI | MO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SPECIFIED | | | | | | | | | | | LADLE NO. |
| CHARGED | | | | | | | | | | | HEATS ROOF |
| TEST #1 | | | | | | | | | | | HEATS LINING |
| TEST #2 | | | | | | | | | | | HEATS BOTTOM |
| TEST #3 | | | | | | | | | | | OPERATOR |
| | | | | | | | | | | | MELTER |
| FINAL | | | | | | | | | | | |

brand names or on suppliers' specifications. Records are kept on roof "life," side-wall "life," and bottom performance. Reordering of material is then based upon the performance record; the maintenance of proper quality is left to the supplier, who is induced to act by virtue of economic pressure. A poor performance may lead to the loss of an account.

Furnace sundry materials, such as fluorspar, de-oxidizers, aluminium, etc., generally follow the same pattern as furnace refractories. A few foundries use their own purchase specifications and check these materials, but the majority rely on the suppliers for their control and base their use on performance.

### Charges

Many foundries establish standard charges for the grades of steel they produce. Definite quantities of the various materials are designated and the charges are made up and weighed and the weights recorded. This information is then incorporated on the heat report and this becomes a part of the permanent record of the melt of steel. Melt charges are controlled so that sufficient carbon and silicon are present to permit proper melt-in values to allow an adequate boiling and refining period.

Foundry returns, heads and gates, generally make up about 50 per cent of the charge. Care is taken that they be reasonably clean and free of an excessive amount of sand. Foundries producing alloy-steel castings exercise considerable care in the proper segregation of the alloy scrap. Colour codes and the proper painting of scrap are frequently used for identification purposes. One foundry producing large alloy-steel castings uses a letter designation for the various grades of steel made. This letter is cast on the casting with the serial number and is also on the feeders, so that when they are severed from the casting, the proper colour of paint can be applied. The cast letter is a positive identification and serves a useful purpose in the later processing of the casting, *e.g.*, with regard to preheating for cutting or welding, the proper electrode to use in welding, heat-treatment, and so on.

Foundries operating machine-shops have the problem of segregating and utilizing the turnings thus generated, and every effort is made to keep them suitably segregated. Excess steel is often poured in sand moulds, with care being taken that the masses of metal thus formed are not excessive and are free from too much adhering sand. In some cases, excess metal is poured into small ingot-moulds or pig-casting moulds, resulting in a much cleaner product of uniform size.

Sizing of scrap is important in order that compactness can be achieved in the charging of the furnace. This, of course, becomes an important factor in efficient electric-furnace operation, but is also to be considered in open-hearth operations. The greater problem is, of course, posed when bulky purchased scrap and turnings are to be utilized. Much bulky scrap is bundled, and pro-

vided that the complete history of the source of the scrap is known, it can be very properly utilized. However, care must be exercised in the use of bundled scrap if its history is unknown. Vigilance must always be used in checking purchased scrap to avoid charging alloy-scrap in carbon-steel grades and to remove non-ferrous scrap, which may be deleterious to both steel quality and to furnace refractories.

### Melting and Chemistry Controls

Rapid melting is desirable in all cases, but is particularly significant in open-hearth* operations when the fuel is sulphur-containing fuel oil. The sulphur compounds in the products of combustion are readily absorbed by the melting scrap until a protective cover of slag is formed. Size of scrap, skill of placement of scrap in the furnace on charging, and control of combustion all contribute to the resulting sulphur content of the melt. The best sulphur control in steelmaking is (i) to keep the sulphur content of the charged materials as low as possible, and (ii) a rapid melting of the charge so as to form a protective blanket of slag as soon as possible and thus greatly reduce the sulphur pick-up from the furnace atmosphere. Combustion control is important in open-hearth operations to ensure the efficient use of fuel, achieve rapid melt-down for the control of temperature, and avoid excessive wear of furnace refractories. Control is based upon flue-gas analysis and/or the experienced eye of the melter and first helper.

After the charge is melted, a brisk oxidation period, which may be aided by the use of iron ore or oxygen, is common to all steelmaking practices. The control of the reactions is based upon:—(i) the reading of the fractures of test samples taken at intervals and cooled in a prescribed manner, (ii) the use of carbon analyser of the magnetic type on the furnace floor, and (iii) the submission of samples to the chemical laboratory for analysis. Method (i) is little used, except as an adjunct to methods (ii) and (iii), and then usually only on commonly-made grades of carbon or alloy steel. Method (ii) is used to some extent, but, again only as an adjunct to method (iii). The latter is, of course, used for control purposes by all plants. The number of preliminary samples varies from 1, in the case of some electric-furnace operations, to 8-10 in some open-hearth operations. Generally, at least three tests are taken.

Carbon is determined in all cases by combustion methods. Makers of electric steel often determine manganese, and frequently the normal alloying-elements, nickel, chromium and molybdenum. Acid open-hearth steelmakers determine manganese, silicon, and frequently the alloying elements, while basic open-hearth steelmakers determine manganese, sulphur, and, to some extent, phosphorus.

The vigour of the oxidation period can be judged by the boiling action. A plot of carbon elimination is also useful in the case of open-hearth steelmaking.

* Open-hearth melting is practised for the bulk of the steel cast at the Author's foundry.—EDITOR.

Fig. 2 illustrates a form used as a heat* log in an open-hearth plant. Space is provided for recording the essential items which occur during the progress of the melt, starting with the charge, furnace additions, ladle additions, temperature readings, history of preliminary samples and results; furthermore, a graph of the carbon content during the progress of the melt is plotted to show the rate of carbon elimination to the melter and first helper.

Information from the heat-log is later transcribed to an official heat-report, which becomes a permanent record of the melt. Fig. 3 shows the form used in the same open-hearth plant. The time of addition of materials, weight of materials used, fuel consumption, charging time, melting time, total time of melt, tapping delays, tapping temperature, refractory data, ladle-drying data, nozzle size used, skull formation, if any, bottom conditions or repairs, are all recorded. The results of chemical analysis on preliminary tests and on the final ladle-tests are recorded. The form is signed by the melter, open-hearth superintendent, chemist, and metallurgist, and is the official report for the melt. A similar form (Fig. 4) is used by the same company for their electric-furnace operations.

### Chemical Laboratory

The chemical laboratory is the control centre for the steelmaking operations. Chemical analyses are made on many raw materials. Analyses are made on preliminary samples taken during the progress of a melt and then a complete chemical analysis is made of the finished melt of steel. In some cases, samples are taken from important castings and analysed. Laboratory personnel frequently are responsible for temperature measurement, and also often conduct slag analyses.

* The term "heat" is retained here as it is used in the title of the form referred to by the Author. Elsewhere, the term has been changed to the somewhat less-ambiguous term "melt."—EDITOR.

FIG. 5.—*Direct-reading spectrometer installed in a steelfoundry laboratory; it replaces the older film-type equipment.*

*American Steelfoundry Control*

Much of the analytical work is done by conventional wet-methods. In many cases, carbon and sulphur are determined by combustion methods. Colorimetric and photometric methods are used for some of the alloying elements. A number of steel foundries are now using X-ray spectrographic and regular spectrographic equipment and the use of this type of equipment is rapidly gaining favour. These versatile tools, which permit the carrying out of a large volume of work, are especially valuable when a number of compositions are involved. They are also valuable when residual alloy-content and "tramp" element content are desired. The residual aluminium content, which has been receiving attention recently, can be quickly determined by means of the spectrographic method.

In the normal way, carbon and sulphur estimations are based upon combustion and volumetric determinations but Fig. 5 shows a direct-reader spectrometer installed in one of the steelfoundry laboratories. Several types of spectrometers are in use, varying from the older film-type equipment to the electronic direct-reader types.

At the present time, analyses for the hydrogen, oxygen and nitrogen contents of cast steels are not generally made. Some work has been done in this area by a few foundries, but mostly by the use of outside laboratories. A few steel foundries, however, are becoming interested in the gas contents of their steels, in vacuum melting and related subjects, and one steelfoundry laboratory has installed equipment to determine the oxygen content. An inert gas is purified and passed over a heated graphite-crucible containing the sample. Oxides in the sample are reduced to CO and are carried through an oxidizing agent. The $CO_2$ thus formed is then measured in a conductivity cell by the change in resistance, these results being correlated to percentage of oxygen on a graph established from a primary standard. The determination of hydrogen is carried out by the hot-extraction method, i.e., by the removal of the dissolved or interstitial hydrogen by a combination of heat and vacuum.

**Slag Control**

To control the slag is to control the steelmaking process both from the point of view of quality and of economics. It is an important "tool" in the control of the complex reactions occurring during oxidation and refining, since it governs the degree of oxidation. This, in turn, has an important bearing upon the deoxidation practice and the mechanical properties of the steel produced. Slag-control methods vary with the steelmaking process used. In basic open-hearth practice, a rather uniform degree of basicity with the desired FeO content can be achieved by the use of a standard charge and standard slag-forming additions. Early additions of fluorspar help to shape the slag and cause it to become more efficient during the refining period. Slag control is aided by visual observation of the character of the slag since slag composition can be correlated with slag appearance. The slag-pancake test and analytical studies to establish lime : silica ratios and FeO content are frequently used.

In the basic-electric practice. slag samples are judged by colour, thereby gaining information concerning the FeO content. The low FeO slags, less than 1 per cent FeO and grey and white in colour, disintegrate readily into powder. Light-brown slags, containing 1.0 to 1.25 per cent. FeO, will give off a faint odour of carbide when quenched in water and will have a $CaC_2$ content of about 0.75 per cent. Black oxidizing slags contain from 15 to 25 per cent. FeO. The viscosimeter is not used by either the basic open-hearth or basic-electric producers because of the influence of fluorspar additions, which affect slag viscosity.

In acid steelmaking, particularly in the acid open-hearth furnace, the viscosimeter is widely used for slag control purposes, since the slag viscosity and FeO content show a good correlation. Visual examination of the slag and the use of colour and the pancake test are also used.

**Deoxidation**

Control of deoxidation of the steel requires the control of a number of factors, including slag, temperature. types and amount of deoxidizers used, time of deoxidation and moulding practice. Most foundries have worked out a practice to meet their needs, which is based upon their combination of slag control, temperature control, ladle practice, pouring practice which is efficient in producing sound, i.e., whether greensand or dry-sand moulds. A practice which is efficient in producing sound castings with no deleterious inclusion types is then maintained by controlling the variables listed above. In this manner, an efficient, economic and reproducible deoxidation is accomplished.

Since the purpose of this paper is a discussion of controls, and not an exposition of practices as such, details of deoxidation practices will not be given. However, the use of aluminium is widespread, generally from 2 to 3 lb. per ton, with the exception of certain coarse-grained steels, high-temperature steels, and in some acid steelmaking plants. In electric steel foundries, other deoxidizers, such as calcium - silicon, calcium - manganese - silicon, zirconium-silicon, rare earths, etc., are often used in addition to aluminium. Residual aluminium is generally not determined in every melt, except in certain grades. Many foundries not possessing spectographic equipment send the samples to outside laboratories; others use "wet chemistry" methods.

**Temperature Control**

Accurate control of temperatures of liquid steel is extremely important for a number of reasons in the production of quality steel castings. The effect of temperature on deoxidation practices has been discussed. Melting losses are kept to a minimum

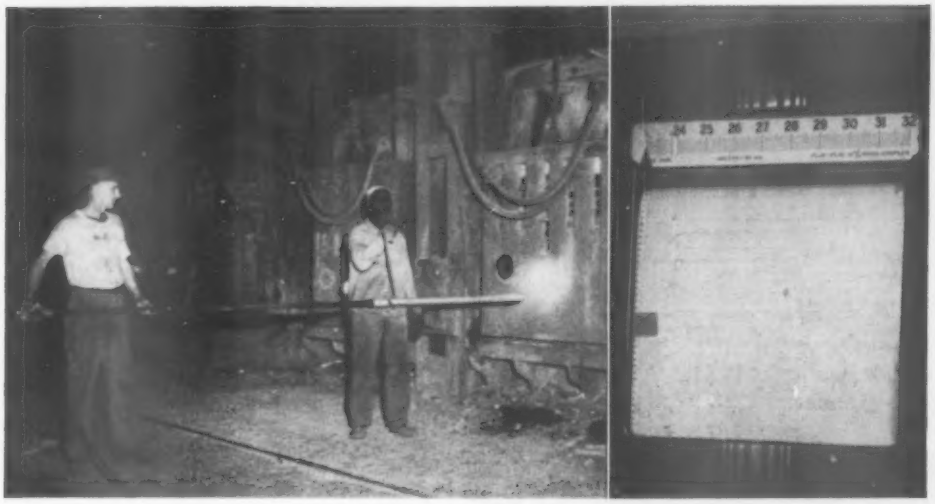


FIG. 6.—*Use of an immersion thermocouple at an open-hearth plant, the significant features being the expendable thermocouple cartridge and the cardboard protection-sleeve. On the right is shown quick-setting strip-chart recorder used with immersion thermocouple.*

by control of the rate of heating and time at temperature. Furnace additions must be made at suitable temperatures in order that proper solution results and the proper composition is attained. Gas control is definitely related to temperature; if temperatures are too high, gas solubilities are increased and the rate of gas absorption from furnace atmosphere is increased. On the other hand, if metal temperatures are too low, the scavenging action of bubble formation and gas purging is seriously reduced.

Metallurgical properties, such as grain size, segregation, cleanliness and strength may be influenced by pouring temperatures, but the greatest factor is that of fluidity. The temperature must be such as to give adequate fluidity so that accurate reproduction of the mould cavity is achieved. The metal composition, type of mould material, thickness of casting section and intricacy of mould cavity, all must be considered in determining the proper pouring temperature. Pouring temperatures can, therefore, contribute to the quality of the casting and its surface appearance.

The subject of temperature control has received much attention in recent years. The optical pyrometer has been in widespread use among steel foundries for many years, but its limitations as a control instrument have been recognized. Temperature and fluidity have long been under study and the use of the fluidity spiral test still has some application in the control of steel temperature during steelmaking.

The combination of an expendable-tip immersion thermocouple and the rapid reading recorder has given the industry a new tool which is finding widespread use among steel foundries. A recent survey shows that it has supplanted the optical pyrometer as the number one method for temperature measurement. Positive results can now be obtained at a relatively low cost and the industry is rapidly changing to the use of the immersion Pt-Pt/Rh thermocouple. Temperature measurements are made in the control of bath temperature and pouring temperature. In some cases the temperature of pouring individual castings is also obtained.

Fig. 6 shows the use of an immersion thermocouple at an open-hearth furnace. The significant features are the expendable thermocouple cartridge and the cardboard protection-sleeve. A strip chart, quick-acting recorder is used with the immersion thermocouple, and accurate reproducible readings are obtained in an immersion time of approx. 5 sec.

## Pouring

*Ladle Practice*

The complexity of the industry is again noted in the many types and sizes of ladles used, such as bottom-pour, lip-pour, teapot-type and shank ladles of lip- and teapot-pour types. The chief control measures taken are in ladle preparation and ladle preheating.

Negligence in ladle preparation, or improper use of refractories, lead to many foundry difficulties and casting defects. The best control is to develop standardized methods for cleaning and repair of used ladles, choice and application of refractory linings, drying of newly-lined ladles, drying and assembly of the stopper-rod assembly in the case of bottom-pour ladles, and preheating prior to use. Ladle inspection, to assure that vent holes are open

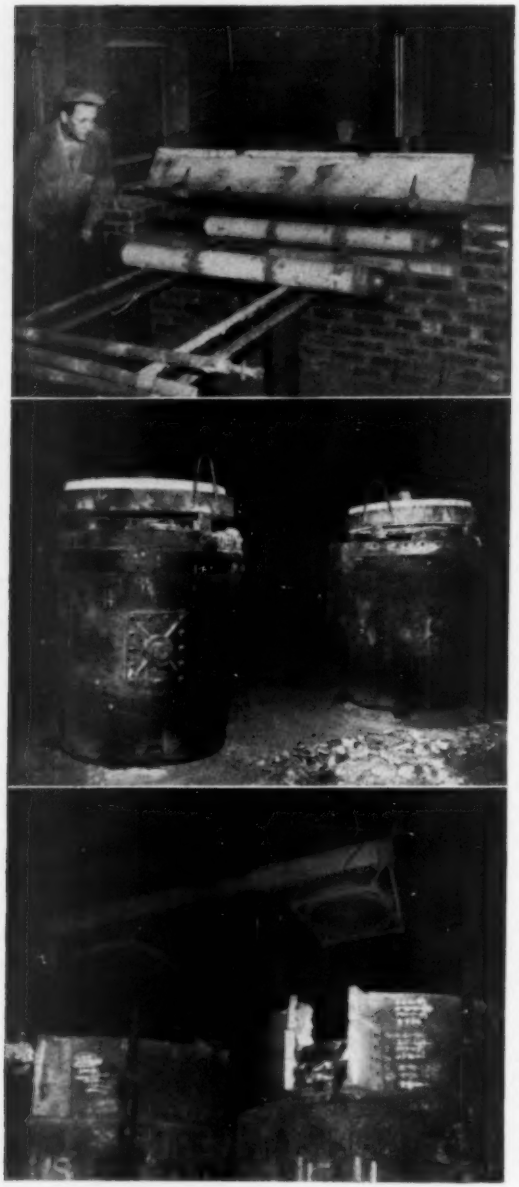


FIG. 7 (*top*).—*Method of drying the stopper-rod assembly on bottom-pouring ladles. The assembly enters a chamber, heated by steam pipes, and passes through it. Fig.* 8 (*centre*) *shows bottom-pouring ladle covers used in the drying operation. Fig.* 9 (*bottom*), *jib-mounted fans for cooling ladles prior to removal of skulls and slag.*

and not plugged, is worthwhile. If the steam cannot escape from the vents, it could dissociate into oxygen and hydrogen and the latter may then be absorbed by the molten steel.

Complete dryness of the furnace spout, the ladle linings and the stopper-rod assembly is necessary to avoid hydrogen pick-up by the molten steel. Fig. 7 shows a simple method for drying the stopper-rod assembly prepared for bottom-pour ladles. The freshly-prepared stopper-rod assembly, consisting of sleeves and stopper head joined with refractory cement, is inserted at one end of the chamber and progresses through the chamber, which is heated by steam pipes, to the exit where the dried assembly is removed when required for use.

Fig. 8 illustrates the use of a ladle cover and burner for drying a large bottom-pour ladle. Both oil and gas burners are used, but more gas burners are in use than oil. Preheating time varies with the size and condition of the ladle and with individual types of equipment and methods used. Ladles are generally preheated to 760 to 870 deg. C.; in a few cases, the ladle temperatures are greater than this range and in other instances lower temperatures are used. One steel foundry uses a thermocouple and strip recorder to control the drying and preheating of their bottom-pour ladles. The thermocouple is inserted in the base portion of the ladle and a drying record is obtained.

Cleaning of ladles prior to re-use is important. Ladles must be cooled, sometimes by the use of fans (see Fig. 9), in order that the workmen can remove old skulls and slag. If this is not properly done, the quality of the steel in the subsequent melt may be adversely affected; this condition may also contribute to casting defects. The control for the proper cleaning and preparation of the ladles is generally in the hands of the ladle foreman, or supervisor, of the melting department.

*Pouring Temperature*

Both the melting superintendent and the foundry superintendent are concerned with the use of proper pouring temperatures consistent with the types of equipment in use, the size and complexity of the castings poured and the handling methods necessary in their particular plant. Control of pouring temperature starts with the control of the tapping temperature, the control of the ladle temperature and the knowledge of the temperature loss in the ladle in the time interval between tapping and pouring.

Some steel foundries have worked out for their practice an empirical relationship, whereby they control the pouring temperature by the tapping temperature and the holding time in the ladle. This is based upon measurements made covering a period of time and recognizing the controllable variables until a curve can be drawn within a reasonable scatter band of results. Other foundries actually measure the pouring temperature of the steel as it enters the gating system of important castings by means of a portable immersion Pt-Pt/Rh thermocouple. Fig. 10 illustrates this type of equipment on the pouring floor. The thermocouple

FIG. 10.—*Portable immersion-thermocouple equipment mounted on a mould to measure pouring temperature. In the foreground of the photograph can be seen the quick-acting temperature indicator.*

in the quartz sheath is inserted in a hole in the tile downgate at an angle of approximately 45 deg. from the horizontal. If the angle is less than 45 deg., the shock of the flowing metal stream may cause damage to the thermocouple. The same arrangement may also be used at the base of the runner cup when the pouring is such that the cup is kept filled during pouring. In the foreground of the photograph is shown the quick-acting temperature indicator.

The third method for controlling pouring temperature is by use of an optical pyrometer. This method is still in widespread use, but more emphasis is being placed on immersion and empirical methods.

*Pouring Rate*

Control of the pouring rate rests in the hands of the foreman supervising the pouring of the castings. In some plants, the pouring procedures are determined by a planning group or planning engineer; these are based upon design characteristics, gating and feeding practice, and the durability of the mould and core material. The rate of rise of the metal in the mould is significant for its effect on temperature gradients and on the surface characteristics of the casting.

The planning group, foundry engineer, or foreman responsible for the pouring practice often must consider the matter of pouring temperature and pouring speed with all the pros and cons and then determine the best course of action for the particular design and set of circumstances at hand. Should the casting be poured slowly, using a high casting-temperature—or should is be poured rapidly with a low degree of superheat? In the first case, pronounced thermal-gradients are produced which, in a casting well designed for directional solidification, will aid in achieving soundness. High pouring-temperatures place a greater burden on the mould and core material and may contribute to sand defects. Rapid pouring at a low superheat will keep temperature gradients at a minimum and will be the more desirable approach when castings are poured whose designs do not promote directional solidification. Also, unless the steel is introduced with a turbulent flow, sand defects should be kept to a minimum.

The general policy, therefore, is to fill the mould cavity as quickly as possible with steel as cool as possible in order to overcome the adverse temperature-gradients of gating into the bottom of the mould and top feeding. Control is achieved by first establishing a policy to be used and then controlling the actual metal temperature, the design of the gating system and the actual speed of pouring.

*(To be continued)*

## BR Express Freight Services

The views of exporters who use British Railways Export Express Service have been collected in a survey carried out by the Association of British Chambers of Commerce in conjunction with the British Transport Commission, and are summarized in a report issued last month. Of the 1,300 exporters covered by the survey, about 80 per cent. were manufacturers and 16 per cent. merchants, the remainder combining both functions. The exporting manufacturers included in the survey represented about 10 per cent. of the national total, and the annual export tonnage of 2,500,000 covered by the sample was similarly about 10 per cent. of the total tonnage of UK exports. Coal and oil exports were not included.

The Export Express Service, which gives an assured arrival next day for traffic in wagon-load quantities, now covers 10 ports and nearly 330 inland centres. Over 90 per cent. of the exporters represented in the survey expressed satisfaction as to the reliability, freedom from damage and acceptance times of the service—one-third of them were not satisfied with the rates.

## International Scrap Bureau

The *Bureau International de la Récupération* (International Reclamation Bureau) in agreement with the Associazione Nazionale dei Commercianti in Ferro e Acciai, Ferramenta e Affini Metalli e Rottami (Assofermet) has approved the following arrangements for the annual general congress to be held from May 16 to 18 in Rome.

On Tuesday, May 16, there are to be meetings of the waste paper section; the finance committee; textile section and the rules and regulations committee, whilst the next day there are to be sessions for the scrap iron and steel section; propaganda and public relations committee; non-ferrous metal section and the executive committee of the Bureau. On the Thursday there is a meeting of the management committee and the general assembly. All the meetings will take place at the Hotel Plaza, 126, Via Del Corso, Rome. The official closing banquet, on the Thursday evening at 8 for 8.30 p.m. will be held at the Museo Delle Arti E Tradizioni Popolari, at the Exposition Universelle de Rome. The luncheon of the scrap iron and steel and non-ferrous metal sections, on the Wednesday, will also be held at the Museum.

## Technological Courses in Michigan

Each summer the College of Engineering of the University of Michigan offers a series of intensive courses especially designed for practicing engineers and scientists in rapidly developing fields of technology. Three special courses offered this summer are "Machineability of Metals" (June 19 to 24) which will be concerned with methods of achieving control over product function, size, and surface finish at optimum economy by application of the principles of machineability; "Application of Stress-analysis to Design and Metallurgy" (June 24 to 28) the purpose of which is to provide engineers, designers, and metallurgists with principles and methods for applying stress-analysis to the problems of engineering design, material specification, laboratory testing and field failures; and "Mathematical Modelling for Metal-casting Processes" (August 14 to 23).

The latter course will describe the application of modern mathematical techniques in the formulation and solution of mathematical models for various metal-casting processes. The modelling technique, it is said, promises great savings in labour, materials and time over the experimental trial-and-error technique of arriving at optimum casting conditions. The course follows a summary of the present status of mathematical simulation with a detailed description of new methods and applications. Practical example problems from the areas of die-casting, permanent-mould casting, and continuous and sand casting serve to illustrate the mathematics involved. A bachelor degree in engineering, the physical sciences, or the equivalent background is a prerequisite. Fees for the courses are $185, $160 and $230 respectively. Further information may be obtained from Mr. R. E. Carroll, Engineering Summer Conferences, 126a West Engineering Building, University of Michigan, Ann Arbor, Michigan, USA.

## Gating Systems

Gating-system design, long considered a casting art, can be transformed into a casting science by applying the principles of hydraulics, according to Battelle Institute metallurgist John Kura. Writing in the current (December) *Battelle Technical Review*, Kura says, "It is evident that science is applicable in the development of superior gating systems. Many so-called tricks of the trade are used successfully in various commercial foundries to produce acceptable castings. Upon close analysis, invariably these devices can be shown to be applications of definite principles. Intelligent application of principles in designing the gating system can lead to more consistent production of high-quality castings."

An idealized gating system, based on a 12-year study of fluid-flow characteristics and basic gating principles, is described in the article. The system features:—(1) A pouring basin to prevent dross from entering the system (the basin should be kept well-filled to prevent formation of a vortex); (2) a tapered downgate to keep air from being sucked into the molten metal and to control the rate of mould filling; (3) a well placed beneath the sprue to serve as an erosion-preventing cushion; (4) gates taken off the top of the runner to provide cleaner metal to the mould, since dross clings to the surfaces of a filled runner; (5) a runner extended beyond the last gate to trap molten metal containing dross and air; (6) streamlined channels throughout to reduce the turbulence which churns air into the liquid metal.

The same metallurgist also points out the relationship of gating dimensions to fluid-flow characteristics and lists the ratios that should be built into a gating system to control the velocity and turbulence of the metal. The extent to which these techniques need to be used, it is stated, depends largely upon the cleanliness required of the casting, the casting design, and the type of metal being cast.

## SIF Long-service Brothers

Mr. Herman Sore and Mr. Pip Sore were awarded long-service presentation clocks at the Suffolk Iron Foundry's Christmas party, held at the Savoy Ballroom, Ipswich. The clocks were presented by Mr. Vincent Jobson, chairman and managing director of the Qualcast group, who is standing between the brothers. With them are (left to right) Mr. T. W. D. Cooper (joint assistant managing director, Qualcast), Mr. H. Clarke (chairman of SIF and a director of Qualcast), Mr. S. Webster (general manager and director, SIF), and Mr. F. Tibbenham (director, SIF). In all, 22 representatives of all 16 departments of SIF, with a total length of service of 430 years, were handed clocks by Mr. Jobson.

# Economy with the $CO_2$ Process

*By D. J. Cousins*

Disadvantages of the $CO_2$ Process at present have been quoted as:—(*a*) the expense of pre-drying the sand; (*b*) lack of green-strength in the sand/silicate mix, and (*c*) the fact that the sand is generally discarded after use. Experiments have been carried out by the Author using mixtures of damp sand with a sodium-silicate addition, but the results showed that only a very small amount of moisture in the raw sand could be tolerated, *i.e.*, less than 1 per cent. Above this, there was found a serious drop in the permeability of the gassed sand, scabbing occurred on the castings, and the sand had a tendency to stick to the pattern equipment.

### Introduction of Knockout Sand

Experiments were next carried out with the introduction to the new sand of broken core and moulding sand from used $CO_2$-sand mixtures, taken from the knockout. This material was crushed in a roller mill and rebonded with sodium-silicate. However, on gassing with $CO_2$, the mixture would not harden. Subsequent work showed, however, that if the used $CO_2$ sand was remilled and rebonded with a sodium-silicate addition plus a moisture addition, the sand then readily hardened when gassed with $CO_2$.

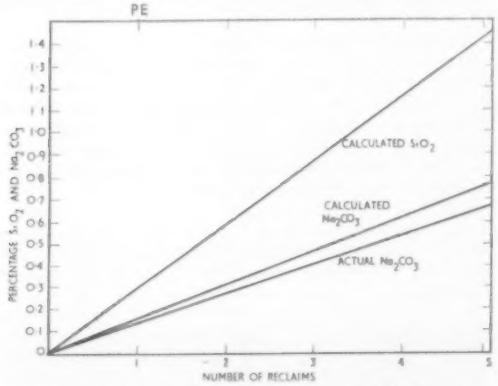



FIG. 1.—*Sodium carbonate and amorphous silica contents of reclaimed sand per cent. according to percentage of added silicate. Calculations based on silicate "A" (Na₂O 8.89 per cent., SiO₂ 28.96 per cent.). (Reproduced by courtesy of the British Cast Iron Research Association.)*

In further support of this observation, it is germane to quote the following notes taken from a report in the British Cast Iron Research Association's *Journal* (December, 1958), by Mr. D. A. Taylor:—

"Tests were carried out on a reclaimed sand by preparing a large amount of sand bonded with 4 per cent. silicate 'A' ($SiO_2$ to $Na_2O$ ratio of 3.3:1, $H_2O$ 62.15 per cent.). This was tested and all the sand was then completely gassed and dried at 200 deg. C. The dried sand was then broken up and sieved to its original grading, rebonded with another 4 per cent. silicate and retested. This procedure was repeated several times and after each reclamation, the sodium-carbonate content of the sand was estimated as a guide to the amount of silicate that had been added.

"The results of these tests showed a considerable drop in strength if the sand was rebonded with silicate alone. However, strengths comparable with the original mix could be obtained by adding a certain amount of water. If the silicate-bonded sand is reclaimed in the dry state, it appears that a certain amount of water is necessary to wet the amorphous silica and sodium carbonate present before the fresh silicate binder is added and the amount of this could be roughly calculated from Fig. 1."

### Results in Practice

Four per cent. silicate (grade C 112) (with an SiO to $Na_2O$ ratio of 2:1 $H_2O$ 54.4 per cent.) was milled with virgin sand and tested, giving permeability 170, green-strength 1 lb. per sq. in., and dry-strength 120 lb. per sq. in. The same sand was re-milled after use, plus a moisture addition, and rebonded with 4 per cent. silicate and tested (permeability 200, green-strength 3 lb. per sq. in., and dry-strength 140 lb. per sq. in.).

With the previous work in view, it was decided to conduct practical tests where used $CO_2$ sand was re-milled with an addition of damp sand rebonded with silicate. It was found that re-used $CO_2$ sand with an insufficiency of moisture had a bench "life" of two to three days and on gassing, could only be hardened to a depth of $\frac{1}{4}$ in. On the other hand, however, if the quantity of moisture was too high, the sand when gassed was slightly friable.

A moisture range of $\frac{1}{2}$ to 1 per cent. was decided upon from the experimental data and a practical process has now been devised as follows: Reclaimed $CO_2$ sand is charged into a large-diameter roller-type mill and an addition of damp new sand is made in amounts depending upon the actual moisture percentage in the new sand. The mill used for this process is of a somewhat antiquated design, consisting of a 5-ft. dia. rotating pan, with a stationary roller-shaft, the rather heavy single roller being free to turn with the sand contained in the pan. However, an advantage of this mill is that the roller can be lowered to allow it to revolve within $\frac{1}{8}$-in. of the pan surface. Some

roller-type mills, unfortunately, have the disadvantage that the rollers cannot be brought close enough to the pan. The reason for deciding to add the damp sand along with the $CO_2$-sand lumps is for aiding breakdown in the mill, 95 per cent. of the sand being reduced to its original grading after preliminary milling in this way. On continuing the milling after adding the sodium silicate, the lumps completely disappear. What the Author considers to be a tremendous advantage resulting from the new milling method described is that with only one milling operation, the $CO_2$ knockout sand is reduced in size to useable material, quite suitable for ordinary moulding operations.

### Actual Procedure

In practice, it is found that 0.75 per cent. moisture is needed in the final mix. To give this, a 20 per cent. addition of damp sand, having a moisture content of 3½ per cent., may be milled with reclaimed $CO_2$ sand for five minutes, during which time the $CO_2$ sand breaks down. Four per cent. sodium silicate is added after the initial mixing and the whole is milled for a further three minutes, sand is then ready for moulding or coremaking.

When the sand has to be knocked out from around the castings produced, it usually happens that used backing sand and $CO_2$ sand become quite intimately mixed. Separation of these materials can be effected at the Screenerator, the $CO_2$ lumps being next shovelled into a hopper which, in turn, is discharged at the sand mill.

It should be recorded in conclusion that many castings, weighing from a few pounds up to a few hundredweight, have been produced successfully with the process as described. Knocking-out presents no problem and the castings leave the sand with a clean strip.

### Acknowledgment

The Author would like to thank the directors and management of W. S. Barron & Son, Limited, Gloucester, for the facilities afforded for carrying out the above investigation, and for their permission to publish the results.

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### Winget in Merger Talks with Gloucester Railway Carriage

Winget, Limited, manufacturers of concrete mixing machinery, of Rochester (Kent), and the Gloucester Railway Carriage & Wagon Company, Limited, Gloucester, are considering a merger. Net assets of the two companies total £5,000,000. Winget needs more manufacturing capacity to meet the increasing demand for its products, while Gloucester Railway Carriage lacks work for its main business of building rolling stock.

A financial link between the two companies was made last October. An arrangement for a minimum of seven years made Gloucester's surplus capacity available to Winget, and £300,000 was invested by Gloucester in Winget in 6 per cent. convertible loan stock 1967-74.

## Pressure-die-cast Agitators

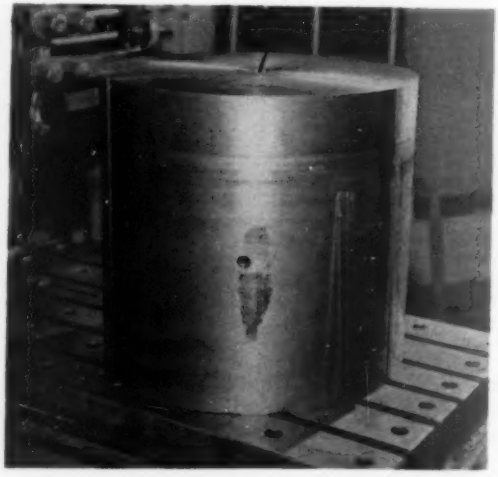
A new system of making domestic-washing-machine agitators, is now being applied by the Meta-Mold Aluminium Company, a subsidiary of the Dayton Malleable Iron Company of Cedarburg, Wisconsin, USA. For the first time, the firm are to pressure-die-cast the agitator for "Speed Queen" washers. In the past gravity-die-cast agitators had been made for the machine, but experiments with the new process showed much promise of a better product, with savings in overall production costs.

The new method is made possible with the use of a segmented die which is made of Potomac M, a "hot-work" die-steel made by the Allegheny Ludlum Steel Corporation. The die assembly is 17-in. long, 18-in. dia. and weighs 11½ cwt.

For casting cycle, the segmented die is fitted into a chuck, or die-retainer. This chuck is itself a heat-treated steel casting, 12-in. high, with overall dimensions of 25 by 28 in., and weight 1,394 lb. To save machining costs, it was cast with an 18-in. hole, located off centre and was furnished by the forging and casting division of Allegheny Ludlum. The use of a cast retainer, it is claimed, made possible a 50 per cent. saving in material and comparable saving in labour costs over machining from the solid.

Pressure-die-casting produces a stronger agitator, with one-third of the operations for gravity-die-casting. After casting, only simple turning and belt sanding are needed to complete the casting ready for assembly. For agitators needing a high lustre, it is reported that the smooth surface of the pressure-die-casting makes possible large savings in polishing operations.

FIG. 1.—*From the die-assembly illustrated, Meta-Mold Aluminium Company of America pressure-die-casts the agitators for "Speed Queen" domestic washers.*



# Personal

Mr. S. J. STANBROOK has been elected a director of Radiation, Limited.

Mr. W. W. KEE has been appointed an additional director and Mr. H. J. SMITH appointed secretary of Enfield Rolling Mills, Limited.

Mr. N. R. DENT has been appointed manager of the Fisher Governor Company, Limited, a member of the Elliott-Automation group.

Mr. H. JACKSON has retired after 55 years' service with Isaac Butterworth, Limited, the Rochdale iron-founders and fireplace manufacturers.

Mr. JOHN L. LIGHTFOOT has been appointed secretary to Hall & Pickles, Limited, Hydra Steelworks, Ecclesfield, Sheffield, retaining his directorship.

HM Senior Medical Inspector of Factories, Dr. SIBYL HORNER, will be retiring in the spring. She will be succeeded by Dr. T. A. LLOYD DAVIES.

CAPTAIN J. K. HAMILTON, R.N., has been appointed a director of Sheffield Forge and Rolling Mills Company, Limited, a subsidiary of the Darwins group.

Mr. W. LATTA has been appointed a director and general manager of Rhodes, Brydon & Youatt, Limited, pump manufacturers, Redditch Engineering Works, Stockport.

Lieut-Col. G. N. BLAIR, principal of Wakefield Technical and Art Colleges for the past 23 years, is to retire in August. He was previously principal of St. Helen's technical college.

Presentation of a gold watch has been made to Mr. STANLEY METCALFE in recognition of his 25 years' service with the firm of Hepworth & Grandage, Limited, Hirst Wood Works, Shipley.

Mr. HAROLD B. FINCH has been appointed a director of Hick Hargreaves & Company, Limited. Mr. Finch is chairman and managing director of Finch Watson, Limited, of Greengates, Accrington.

Mr. A. W. TURNER, general manager, has been appointed local director of Lockheed Precision Products, Limited, of Speke, Liverpool, a subsidiary of Automotive Products Associated, Limited.

Mr. J. R. CARR and Mr. E. M. DALLIMORE have been appointed directors of Gueret Llewellyn & Merrett (1951), Limited, a Powell Duffryn company. Mr. Carr is also to be manager of the tanker department.

Mr. J. FERGUSON SMITH, a special director of Vickers-Armstrongs (Aircraft), Limited, has been appointed deputy general manager. Mr. J. A. PULL, engineering manager, has been appointed a special director.

Mr. ST. JOHN DE HOLT ELSTUB has been elected chairman of Amal, Limited, a subsidiary of Imperial Chemical Industries, Limited, in succession to Mr. J. M. HENDERSON who retired on December 31.

Mr. D. W. PAYN has resigned as general manager and secretary to the Lead Development Association and has taken up an appointment as secretary designate to the London Master Builders Association.

Major WILLIAM LOGAN, general sales manager of Avo, Limited, a member of the Metal Industries Group, has been appointed to the board of the company and will assume the responsibilities of sales director.

The Society of Chemical Industry announce that the Society's medal has been awarded for 1961 to Sir CYRIL HINSHELWOOD, O.M., past-president of the Royal Society and Nobel Laureate for Chemistry.

Mr. C. H. DAVY, resident director of the Scottish works since 1951 of Babcock & Wilcox, Limited, is returning to London, where he will take up duties at the head office on February 1 as an executive director.

Mr. P. W. SELIGMAN has been appointed deputy chairman of A.P.V. Company, Limited, whilst retaining his present position as managing director. Mr. H. P. N. BENSON has also been appointed a managing director.

Mr. S. E. CLOTWORTHY, managing director of Alcan Industries, Limited, has been elected chairman of the Aluminium Industry Council in succession to Mr. H. G. HERRINGTON, managing director High Duty Alloys, Limited.

Mr. A. J. HUGH SMITH has resigned from the board of the British Metal Corporation, Limited. He was one of the original directors of the company from its incorporation in 1918 and was chairman of the board from 1943 to 1959.

Mr. WALTER ANDERSON GALBRAITH, general sales manager of the British Materials Handling Division of the Yale & Towne Manufacturing Company, Wednesfield, Staffs, since 1959, has been appointed sales director of the division.

Mr. LAWRENCE WILSON has been awarded the Royal Humane Society's testimonial in vellum for his rescue from drowning of an 11-year-old boy last July. Mr. Wilson is a research technician for Prince-Smith & Stells, Limited, textile-machinery makers, of Keighley.

Mr. J. C. COLQUHOUN retired as chairman of the Manganese Bronze & Brass Company, Limited, on December 31, 1960. Mr. J. C. BUDD has been appointed chairman as from that date and Mr. R. DENNIS POORE has been appointed a director.

Mr. A. BROOMHEAD, assistant managing director, Thos. Firth & John Brown, Limited, Sheffield, has been appointed deputy managing director, with effect from January 2. Mr. F. WORTLEY, a director, has been appointed general works manager.

Mr. R. O. MACGOWAN has been appointed manager, spares and service department, of Aveling-Barford, Limited, in succession to Mr. T. H. B. WHITING, who recently took up a new post as London director for the Aveling-Barford group of companies.

Mr. J. A. METCALFE has joined the board of Foseco International, Limited—with effect from October 28. Mr. Metcalfe, a director of Minerals Separation, Limited, and many other companies, has been a director of Foseco Holdings, Limited, since January 1.

Three new appointments announced by Lansing Bagnall, Limited, are of Mr. ALAN POTTER as general sales manager; Mr. EDGAR HARRY WHEELER, export sales manager, and Mr. CHARLES ARTHUR BARR, manager of the company's technical services division.

Mr. J. R. A. BULL, chairman and managing director of Sanderson Kayser, Limited, has become managing director of its subsidiary, Kayser Ellison & Company, Limited: Mr. L. A. K. HALCOMB has retired as managing director of Kayser Ellison but continues as chairman.

Mr. John Hare, Minister of Labour, has appointed Mr. ROY M. WILSON, Q.C., to be President of the Industrial Court in succession to Lord FORSTER, who retired at the end of last year. Mr. Wilson is already a member of the chairmen's panel of the Industrial Court.

Midland Heating & Ventilation Company, Limited, announce that Mr. J. B. MATTEI, M.A. CANTAB., B.SC., A.M.I.MECH.E., has been appointed to their London

*Personal*

sales organization. He will also be responsible for the sales of their associate company, Carter Thermal Engineering, Limited.

Mr. WILLIAM T. COLLYER, who retired at the end of last year, was presented with a silver salver by employees of Aeroplane & Motor Aluminium Castings, Limited, Erdington, Birmingham. Mr. Collyer was one of the two founder directors of the company which he joined 29 years ago.

Mr. R. LEWIS STUBBS, director of the Zinc Development Association, has been appointed director-general of the Lead Development Association. He will be responsible for the overall direction and expansion of the work of both organizations, and will represent them at international meetings.

At the end of 1960, Mr. JOHN BAILEY relinquished his position as sales director of Brook Motors, Limited, but remains on the board as technical consultant. Mr. DAVID BROOK assumed the position of sales director for the home market on January 1, and Mr. G. H. BROOK has been made sales manager.

Mr. W. F. SLATER has relinquished the post of general manager, Thomas Bolton & Sons, Limited, manufacturers of copper and copper-base alloys, Widnes. He continues as a director with special duties. He is succeeded as general manager by Mr. L. C. W. TURNER, who has also joined the board.

Mr. H. M. GREGORY, general manager (works and construction), and Mr. J. D. WILLIAMS, chief engineer, have been appointed directors of John Brown Land Boilers, Limited, Whitecrook Works, Clydebank, Glasgow. Sir JAMES M. MCNEILL and Mr. T. MENSFORTH have retired from the board.

Mr. VINCENT L. BRAILSFORD, secretary of the Coventry Chamber of Commerce since 1939, is resigning to become commercial manager of Alfred Herbert, Limited, Coventry. The post is a newly-created one and Mr. Brailsford will have a seat on the board when he takes up the appointment on March 1.

Mr. ARTHUR WAINWRIGHT, aged 63, who has now entered his 51st year of service with the David Brown engineering organization, received a presentation at the Park Works, Huddersfield, from Mr. Allan Avison, managing director of the David Brown Corporation, Limited, to mark his long connection with the concern.

Mr. G. E. SAVORY has been appointed assistant managing director of Ruston-Bucyrus, Limited. Mr. F. WILDMORE has been appointed to the board as director and commercial manager. Mr. Savory has been sales director of the company since 1949, and Mr. Wildmore has been commercial manager since 1951.

Mr. H. T. COLLINSWOOD, who was recently elected a director of Pulsometer Engineering Company, Limited, pumping and filtering engineers and ironfounders, Nine Elms Iron Works, Reading, has been appointed chairman in succession to Mr. F. B. DUNCAN, who has relinquished that post at his own request and has retired from the board.

Delta Metals Company, Limited, announce that Mr. K. E. WEST is to be appointed managing director of Earle Bourne & Company, Limited, Birmingham, in succession to Mr. J. R. ROBY who has resigned. Mr. W. S. DAVIS is to be appointed secretary of Earle Bourne and Alfred Case & Company, Limited, Birmingham, in place of Mr. F. J. BINDON-BLOOD who has retired.

Mr. R. P. S. BACHE, chairman and managing director of Geo. Salter & Company, Limited, West Bromwich, left England on January 9 for India where he is to spend a few days each in Bombay, Delhi and Calcutta, returning to this country on January 24. On March 18, Mr. Bache will commence a round-the-world sales trip, spending some time in Australia, New Zealand, South Africa and Rhodesia. He expects to return on May 25.

Mr. J. H. B. CHAPMAN is to retire as Director of Naval Construction in April after more than 44 years in Admiralty service, during which time he became the first Director of the Naval Construction division on the creation of the new Ship Department of the Admiralty two years ago. In this appointment he has been the chief warship designer. His successor will be Mr. A. N. HARRISON, who has been assistant Director of Naval Construction since 1951.

Long-service awards have been presented by Mr. G. M. Menzies, chairman and managing director of the North British Steel Foundry Limited, Bathgate, to the following employees of the firm; Mr. JAMES BAXTER (buyer); Mr. JAMES CLARK (foreman, moulding dept), and Mr. ANDREW BINNING (patternshop), all of whom have completed 40 years' service, and to Mr. THOMAS HAIR, Mr. WILLIAM STRATHERAN, and Mr. WILLIAM SUTHERLAND (all of the moulding department), for 25 years' service.

Mr. L. J. GARIBALDI has been appointed manager of the steam and gas turbines division, English Electric Company, Limited, at Rugby, in succession to Mr. A. FRISWELL, who has retired after serving the company since 1921. Mr. Garibaldi has been contracts manager, steam turbine division, since 1955. He will be responsible to the general manager, Rugby and Whetstone, for all commercial activities connected with turbines, and for co-ordination of policy and engineering, sales and contracts.

Mr. P. J. C. BOVILL, managing director of Newton Chambers & Company, Limited, Thorncliffe, returns to England this week from a business trip in America. Others news from the company is that Mr. WALTER WASHBOURNE has been appointed general manager of the excavator division of the firm in succession to Mr. R. J. PALMER, who continues as a local director of the division until his retirement in the spring. Mr. Washbourne has been general works manager of the Wolverhampton Die Castings Company, Limited, but was previously at Thorncliffe.

Mr. ELIS S. HOGLUND, former general manager of General Motors' overseas operations division, has been elected to the board of General Motors Corporation on his appointment as group executive in charge of overseas and Canadian operations. Mr. Hoglund has also been made a member of the Corporation's executive committee. He is succeeded as general manager of the overseas operations division by Mr. EARL C. DAUM, formerly assistant general manager of that division. Mr. Daum has been elected a vice-president of General Motors Corporation.

## *Recent Wills*

CLOWES, A. D., for 40 years a representative for Samuel Osborn & Company, Limited, Sheffield ... £10,536

LANCHESTER, FRANK, co-founder and former managing director of the Lanchester Motor Company, Limited ... ... ... ... ... ... £7,332

SCHUBERT, HELMUT, a director of H. Schubert, Limited, woodworking machinery manufacturers, of London, E.C.1 ... ... ... ... ... ... £73,519

PIKE, J. W., a director of Gaskell & Chambers, Limited, engineers, copper and brass founders, etc., of Birmingham ... ... ... ... £71,456

SLINGSBY, WALTER, head of Walter Slingsby & Company, Limited, makers of malleable and forged steel tube fittings, of Keighley (Yorks) ... ... £49,569

# Equipment and Supplies

## Venturi Scrubber

Ambuco, Limited, Standbrook House, 2/5, Old Bond Street, London, W.1, have recently introduced a new type of venturi scrubber for gas-cleaning, which has a double-scrubbing action. In this scrubber (made under licence from Waagner-Biro) the water is introduced ahead of the venturi by means of a special nozzle (Fig. 1) spraying directly into a specially-shaped entry-piece. The design of the entry is so arranged that the gases are compelled to pass through two

FIG. 1.—*Diagram showing how two separate cones of water are produced to achieve the "double-scrubbing" action in the venturi design. (Ambuco Limited.)*

complete cones of water. In the first cone, the water droplets of a relatively large size are primarily effective in collecting the coarser solid particles from the gas, whilst in the second cone (produced by the venturi-entry shape) the droplets are considerably finer and their velocity is reduced. It is claimed that the size of the water droplet can be varied to meet varying sizes of solid particles, by positioning the water introduction-nozzle relative to the venturi entry. The makers also claim that there is a lower pressure-loss, with consequent lower power-requirements, with this new type of scrubber, for which there are world patents pending.

## Laboratory Furnaces

A range of precision laboratory furnaces designed to give high stability of temperature (±0.25 deg. C.), interchangeable drum control for thermal cycling, and facilities for heat-loss compensation at the ends of the tube, have been introduced by Shandon Scientific Company, Limited, 6, Cromwell Place, London, S.W.7. In the standard range there are three models for maximum temperatures of 1,050 deg. C. with tube sizes respectively of 35-mm. i.d. by 290-mm. long (for operation on 115 v. a.c. electrical supply), 60 by 450-mm. (220 v. a.c.) and 75 by 700-mm. (220 v. a.c.); and two models for maximum temperatures of 1,250 deg. C., with tube sizes of 35 by 290-mm. (115 v. a.c.) and 60 by 450-mm. (220 v. a.c.). Two special models for maximum-temperatures of 1,500 deg. C. are also available, with tube sizes of 16 by 250-mm. (115 v. a.c.) and 35 by 400 mm. (220 v. a.c.). The standard models may be controlled either by a thermostatic regulator Fig. 2 (a) or a chronograph-drum control for thermal cycling Fig. 2 (b), these temperature control arrangements being interchangeable by the user. All models may be mounted vertically or horizontally, and all may be fitted with a water-jacket, *e.g.*, for use in a "glove box." The two special 1,500 deg. C. models are available only with a chronograph-drum control, which is not interchangeable with a thermostatic regulator, and incorporate special windings of platinum-rhodium wire.

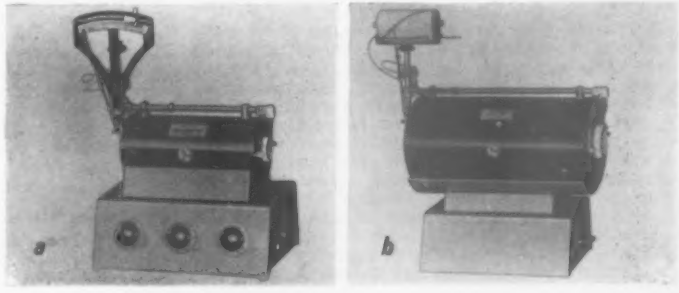



FIG. 2.—*Precision laboratory tube-furnaces; (a) as fitted with thermostatic regulator and (b) with chronographic-drum control.*

## Thickness Meter

Based on a design by the British Non-Ferrous Metals Research Association, a new plating meter has been manufactured by Nash & Thompson, Limited, Hook Rise, Tolworth, Surrey, which can be used for measuring the thickness of most industrial platings. The coulometric principle involves stripping the plating from a standard area and measuring the integration of time and current density. The operation of the meter is simple, it normally occupies only a few minutes, and the meter switches itself off when the stripping action is completed. The thickness of the plating thus removed is determined from a dial reading and a multiplying factor. The meter is mains-operated and is said to be suitable for use both in a research laboratory or for works inspection purposes by non-technical staff. Thickness readings between 0.000004 and 0.0015 in. can be made to an accuracy of ±5 per cent., it is reported.

## Paper Overalls

Miller Rayner (Overalls), Limited, Lorenzo Drive, West Derby, Liverpool, 11, believing that for a number of industrial applications disposable paper-overalls have advantages over fabric overalls which have to be laundered, have placed on the market a range of overalls made of strong paper which is reported to be soft enough to drape well for comfort and good appearance in wear. The material is claimed to be water resistant and flame proof and also to have oil-absorbent properties. The overalls can be sterilized in an autoclave.

**Flame-failure Device:** Elcontrol, Limited, from Wilbury Way, Hitchin, Herts., have issued a data sheet (FSP3-1) giving operational details and specification of a flame-failure unit they produce for use with oil-burners.

**Keelavite Hydraulics, Limited,** of Allesley Coventry, have acquired marketing rights for the Hyro-Titan hydraulic axial-piston units in the United Kingdom and the Commonwealth.

## Complex Bedplate in Grey Iron

An 18-ton grey-iron casting is shown being despatched from the foundry of John Thompson Castings, Limited, Ettingshall, Wolverhampton. One of a multiple order, these cylinder bedplates are produced every two weeks from a foundry which is capable of supplying grey-iron castings up to 50 tons weight.

### Non-ferrous-metals Statistics

A report by the OEEC Non-Ferrous Metals Committee containing statistics for 1959 and trends for 1960, has now been published. The main body of the report brings up to date the statistical information on production, consumption, imports and exports and metal uses at the first processing stage, as collected by the Committee. A statistical series for aluminium end-uses is included, with figures for 1958 and 1959; this means that for the first time, the flow of processed aluminium to the various consumer industries has been put on a comparable basis for European countries. The topical interest of the publication is enhanced by the brief survey (part 1) on market developments in 1960 made by the Committee at the end of October, which also includes short-term forecasts on the activity of European non-ferrous metals industries.

It is stated that the non-ferrous metals industry in the OEEC countries has been in continual expansion since 1950, to a much more marked degree than any other areas in the Western world. Both production and consumption rose by over 50 per cent. and net imports more than doubled, thus increasing considerably the overall dependence of the area on raw materials supplied from outside. Whereas the OEEC area has maintained its proportion of output in the Western world at slightly more than one-quarter, its relative importance as consumer increased and is now approaching that of the United States. The main features of the changes in the pattern of European non-ferrous metals industry are illustrated by graphs.

## Carron Works Dinner

Carron Works Recreation Club paid its annual tribute recently to the elderly gentlemen of Carron. The guests were welcomed by the vice-president of the club, Mr. J. H. McPherson, and after dinner Mr. E. J. Leaver, manager for Carron Company, Falkirk, addressed the gathering.

He said how splendid it was that only 13 of the elderly gentlemen of Carron were unable to attend. Once again, he had noted, Mr. Andrew Reid, who was well over 90, was present. This year two employees, coincidentally also named Reid, had accomplished a remarkable record—the father was joined by his son, and each now was an elderly gentleman of Carron.

He asked his audience to recall the spacious new fitting shop where the bicentenary banquets of May 1959 were held. At that time, he said, only one-third of the present shop space was in existence, to-day the whole shop was complete. It had been called the finest fitting shop in Scotland.

*Foundry Facilities*

The company, Mr. Leaver continued, had rebuilt an entirely new foundry for production of repetition castings. Currently this foundry was producing cast-iron linings for Glasgow's Linthouse-Whiteinch Tunnel under the Clyde. This order was alleged to be one of the largest ever obtained by the company.

The mechanized bath foundry, opened in 1947, was no longer the last word in modern equipment and new plant was being installed which would produce better baths and provide better working conditions for the men. Without actually rebuilding Mungal Foundry, it was constantly being amended and improved. In the engineering department activities during the past year had been directed to setting up machining tools for the tunnel-lining contract. A heavy guillotine and other heavier machines were being added to the press and fabricating department. Carron's had recently secured an order for steel fabrications and this, said Mr. Leaver, represented a new product in the manufacturing range of the company.

## British Display at Delhi Fair

Over 1,500 British firms interested in the Indian market have been invited by the Board of Trade to join in the British display at the second Indian Industries Fair, Delhi, from November 4 to December 21. Other countries exhibiting include Russia, America and Germany.

The British area will consist of three parts: (*a*) An official display of approximately 20,000 sq. ft. giving an overall picture of Britain's contributions to the industrial development of India; (*b*) a shell stand scheme organised by the Board of Trade and leased in units to individual British firms and (*c*) individual stands installed by firms of British origin established in the Indian market. A site of 50,000 sq. ft. has been reserved for the two parts of the official display.

Mr. Charles Munro, M.B.E., has been invited to design the official exhibit in conjunction with the Central Office of Information. Further information can be obtained from the Export Publicity and Fairs Branch of the Board of Trade, Horse Guards Avenue, London, S.W.1.

ABRAFACT, LIMITED, of Sheffield and Gainsborough, have applied to Thonock Estates, Limited, Gainsborough, for extension to their present factory premises.

# Notes from the Branches

## East Anglian Section

Members and visitors at the meeting of the East Anglian section of the Institute of British Foundrymen, on November 21 at the Ipswich Civic College heard Mr. Noel Shaw give a lecture on the "Shaw Process." The occasion was the annual liaison visit to the section by members from the parent branch. Amongst those who had travelled to Ipswich for the occasion were Mr. D. A. C. Hutchison, Mr. A. R. Parkes and Mr. T. Wills, respectively London branch president, secretary and assistant secretary, and Mr. L. A. S. Harbourne, member of Council.

The lecturer, with the aid of a large number of excellent lantern slides, surveyed a wide field of the decade's developments of the Shaw Process, following a preliminary outline of this method of producing precision investment castings from non-expendable patterns. In turn, he dealt with mould characteristics, materials, process details, pattern requirements, casting quality and market development.

On the matter of fields of application, Mr. Shaw said a considerable porportion of the early castings produced comprised difficult pieces which no other process had been able to produce and that previously had only been available by machining from the solid. Simplicity and flexibility had quickly attracted the attention of aero-engine and rocket development and the process became and remained uniquely invaluable in this field.

It was early assessed that in the markets of precision casting as then accepted, the process could hold its own except possibly where long runs of very small standardized pieces such as the requirements of sewing-machine production were sought. Here alone lost wax had been found to retain some economic advantage. For example, one licensee alone was now producing 100,000 golf-club heads annually of high quality in stainless steel. At this order of size, the Shaw economic advantage was slight, and the market had been retained on consistent soundness and low rejection figures, especially at the final stages of polishing where tiny surface defects could cause rejection after money had been spent on finishing processes. From this size upwards, both economic and technical advantages grew, up to the size limits of the lost-wax process and thereafter it appeared to be unrivalled.

### Achievement and the Future

Reviewing present status of the process, Mr. Shaw concluded that at the present moment throughout the world, over 100 firms were operating under licence. Many of these firms had been in successful operation over a number of years and included jobbing licensees selling castings in the open market, and firms who operated Shaw foundries in their own organization purely for their own use. Castings produced ranged from 1 oz. to 5 tons, covering the whole range of steel alloys, cobalt-base alloys, bronzes, berrylium/coppers and aluminium and magnesium alloys.

Finish of castings equalled and sometimes exceeded those produced on small castings by lost-wax methods, Mr. Shaw claimed, and this applied equally to the largest castings as with the smallest. To-day, it was estimated that production in this country exceeded 750 tons per annum of small castings. A similar figure was probably true for European and Asiatic production and in the USA the figure was vastly exceeded. For the future, it seemed reasonable to assume that production would continue to expand as new licensees became operative.

Technically, future development was likely to fall into three main groups: (1) Continued production from moulds made entirely from Shaw materials according to present methods (both in single moulds and stacked assembly). Here, it was thought that much lower materials costs would become operative. (2) Production from moulds of increasing size, having a composite structure and with only critical faces in direct contact with the metal being composed of pure Shaw material, and fully-mechanized production of small castings from thin shell moulds of Shaw material. Prototype machinery for this was already in early design stage.

Following the lecture, the speaker aptly answered numerous questions, the meeting closing with a vote of thanks proposed by Mr. Carnick and a few words of appreciation of the technical value of the evening's proceedings from Mr. Hutchison.

## Northampton Section

Some 48 members and guests attended the fourth annual dinner of the Northampton section of the East Midlands branch held at the Hind Hotel, Wellingborough, on December 16, 1960. Mr. G. R. Shotton, national vice-president, Mr. G. R. Webster, junior vice-president, Mr. G. Lambert, secretary of the Institute, and Mr. W. L. Beresford, president of the East Midlands branch were the official guests.

Mr. A. Tipper, section senior vice-president, who proposed the toast to "The Institute" outlined the history of the Institute from its formation in Birmingham in 1904, with fewer than 100 members. He mentioned that two members of the Northampton section, Mr. C. H. Hanson and Mr. B. Hird had joined the Institute as long ago as 1912. Mr. Shotton responded to the toast, and the "Northampton section" was then proposed by Mr. Beresford. In replying to this, Mr. R. Jelley, section president, reminded those present that (from the local membership) during the past 12 months Mr. Ben Hird had received the Meritorious Services Award; Mr. A. Tipper had been the recipient of the Oliver Stubbs Medal, and four papers written by section members had been published. All this he said was evidence of real progress. The toast to the guests was put over in an extremely amusing manner by Mr. J. Hope, and the last speaker, Mr. Webster (managing director of British Bath Company, Limited, London), extended thanks to the section on behalf of the guests, and said he was looking forward to seeing members of the section on their visit to his company scheduled for June this year.

A surprise item followed in which Mr. Shotton presented a "chain of office" to Mr. Jelley. There had been some talk in the section, said Mr. Shotton, of obtaining a chain of office for the president, and as no time was available to get matters arranged beforehand, members of the section had had to make their own chain that morning. It consisted of a yard of ½-ton hoist load chain with a section of a "blown" casting suitably attached, the whole being finished in gold paint. Mr. Jelley, who is chief metallurgist of Morris Motors, Limited, Nuffield Foundry, Wellingborough, accepted this substitute chain of office in lighthearted vein and immediately made a critical inspection and comment on the source of the casting and the defect therein. To the delight of the manufacturers of the "award," he continued to wear it for the rest of the evening, and Mr. E. C. Rowen of Pattern Equipment, Limited, Leicester, offered to engrave it for him as a souvenir of the occasion.

# Company News

## Peak Iron Output at Colvilles

Record output of pig-iron was achieved by Colvilles, Limited, in the financial year ended September 30, 1960. The company produced 963,586 tons of pig-iron, compared with 673,163 tons in the previous year and the outputs of steel ingots and castings, at 2,056,467 (1,442,312) tons, and of coke, at 698,067 (468,132) tons, also showed marked increases. The directors state that new orders are not now coming in so fast, but the orders on hand will keep the plant fully occupied for some months.

The construction of the strip mill development scheme is being well maintained. The expenditure during the year on all schemes totalled £16,614,174, which the company financed from its internal resources. The new billet mill at Hallside works was brought into commission during the year and the modernization of the melting shop at these works is under way. A start has been made on the construction of the 4-high plate mill at Clydebridge steel works. The directors state that the concentration by the engineering staff on development schemes has meant that some of the larger repair jobs have been deferred.

Net profit for the year was £5,285,000 (£4,913,000), after tax of £4,973,000 (£3,677,000). Final dividend of 10 (8) per cent. makes 16 (14) per cent. for the year.

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COZENS & SUTCLIFFE (HOLDINGS), LIMITED—A one-for-three rights issue of 653,788 new 4s. ordinary shares, at 10s. 6d. a share, is to be made. Net proceeds of about £315,000 will be used to finance recent and planned developments. The issue is payable not later than January 31.

FLETCHER HOUSTON & COMPANY, LIMITED, iron-founders and engineers, of Tipton (Staffs)—Dividend of 30 (26¼) per cent. is to be paid for the year ended September 30, 1960, on capital increased by a two-for-one scrip issue. Consolidated profits were £331,127 (£168,317), subject only to tax of £165,827 (£80,189).

GUEST, KEEN & NETTLEFOLDS, LIMITED—The capital of Holmpress Piles, Limited, concrete piling contractors, of Hull (Yorks), has been acquired for £380,000 cash, from the Northgate Group, Limited. Mr. F. S. Bassett and Mr. G. M. Daintry retire from the Holmpress board which is joined by Mr. H. S. Killick and Mr. P. D. Brown. Mr. A. B. Holmes and Mr. G. W. Roberts remain on the board, Mr. Holmes retiring as managing director, but continuing as consultant.

GEORGE WILSON GAS METERS, LIMITED—In the half-year to September 30, 1960, the group made a profit of approximately £14,000, compared with a loss of £4,500 in the same six months of 1959. Mr. W. D. Wilson, chairman, says that the transformation is due in part to the increase in the selling price of gas meters, but the main factors are substantial savings in factory and administrative overheads brought about by the re-organization of the manufacturing arrangements of the parent and subsidiary, Radiant-Heating, Limited.

MASSEY-FERGUSON, LIMITED—Net income fell in the year ended October, 1960, to $13,153,944 from $21,018,393 previously. Mr. A. A. Thornbrough, president, says that although group sales were 3 per cent. up at $490,413,988 ($475,543,641), earnings were lower as a result of several "special situations." Earnings of the French company were not satisfactory, reflecting another year of unfavourable economic conditions, while there were items which had an impact on the accounts but which in many respects were non-recurring.

# Translation Service

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 1669 LOW-ALLOY FERRITIC STEELS FOR THE MANUFACTURE OF TUBES, FORGINGS AND CASTINGS FOR POWER-PLANT. Sicha, F., and V. Foldyna. *Hutnické Listy* (Prague), 1959, (12), 1097-99. Steels and production technology for plant working up to 560 deg. C. are discussed with special reference to methods current in Czechoslovakia (*JISI* abstract). £3 15s.

BISI 1824 EXPERIMENTAL INVESTIGATION OF SOLIDIFICATION CRACKS IN STEELS: THE INFLUENCE OF IMPURITIES (from French). Guessier, A., and R. Castro. *Rev. Mét.*, 1960, Feb., p. 117. (£9 15s.). The experimental technique used by the authors is described in detail; one feature is the simultaneous preparation in a single mould of 16 specimens, to reduce the number of tests and the effects of dispersion. Results obtained on Ni-Cr austenitic steels show the influence of primary structure on crack sensitivity; completely austenitic structures are much more sensitive than mixed austenitic-ferritic structures. The effects of S, B, P, Zr, Nb, Sb, Cu, Ce, Mn, V, Mo, W, Al, Co Si and Pb on crack sensitivity are considered. The influence of the results obtained on the welding of stainless steels for elevated temp. use is examined (19 refs.) (Abstract *JISI*, 1960, Aug. pp. 501-2).

BISI 1835 RESEARCH ON THE HOT-DEFORMATION OF STEELS. II—HOT-TORSION TESTS; CONCLUSION (from French). Rossard, C., and P. Blain. IRSID publication 174 bis, series A, 1958 Oct., pp. 1-83. (£10.) Design and development of a hot-tensile-testing machine. Tests at a constant natural rate of deformation. Modifications to the structure during deformation.

BISI 1986 WAYS OF REDUCING LABOUR CONSUMPTION IN THE FOUNDRY TRADE (from Russian) Anon. *Lit. Proizv.*, 1959, May, p.1. (£2 5s.)

Translations in course of preparation include:—

BISI 2001 FRACTURES OF CRANE HOOKS AND LADLE HANGERS AND MEASURES FOR THEIR PREVENTION (German). Will, G. *Stahl u. Eisen*, 1954, Aug. 12, pp. 1062-1069. (Abstract *JISI*, 1955, Feb., p. 197.)

BISI 2006 DETERMINATION OF OXIDE INCLUSIONS IN KILLED AND SEMI-KILLED PLAIN AND ALLOYED STEELS (German). Piper, E. *et al. Radex Rundschau*, 1957, (5a. 6d.), pp. 727-737.

BISI 2010 APPLICATION OF CHROMATOGRAPHY TO THE ANALYSIS OF GAS MIXTURES EXTRACTED FROM METALS BY VACUUM MELTING UNDER REDUCING CONDITIONS (French). Baque, C., and L. Champeix. *Rev. Mét.*, 1960, Oct., pp. 919-923.

BISI 2018 INFLUENCE OF NICKEL ON THE STRENGTH OF AUSTENITIC-MANGANESE STEELS. 66-71. Biryulin, V. T., and V. D. Sadovskii. *Akad. Nauk. SSSR. Inst. Fiz. Khim. Trudy*, 1956, (19). (Translated from French version: *IRSID* T1246.)

The following translations are in course of preparation by Mr. H. Brutcher, Technical Translations, P.O. Box 157, Altadena, Calif., USA:—

HB 5029 HOT-CRACKING OF CASTINGS AND WELDS. Bochvar, A. A., *et al. Liteinoe Proizv.*, 1960, Oct., p. 47.

HB 5030 DESULPHURIZATION OF PIG-IRON OUTSIDE THE BLAST-FURNACE WITH ADDITIONS OF ALUMINIUM POWDER. Sobolev, S. K., *et al.* Production and Processing of Steel and Alloys. *Metallurgizdat*, 1960, pp. 5-14.

The following translations are among those now available from Mr. Brutcher:—

HB 5024 ANOTHER NOTE ON THE DEOXIDATION OF STEEL WITH ALUMINIUM. Ovsyuk, G. S., *et al. Liteinoe Proizvodstvo*, 1960, (6), pp. 47-8. (Including N. F. Rodin and I. G. Gorvachev. "Deoxidation and Alloying of Steel in the Ladle.")

HB 5027 EFFECT OF ADDITIONS OF TITANIUM METAL, FERRO-TITANIUM, AND A COPPER-TITANIUM ALLOY ON THE STRUCTURE OF GREY IRON. Report VIII. Sawamura, H., and M. Tsuda. *Tetsu to Hagane*, 1957, (11), pp. 1234-1242.

HB 4897 OBSERVATIONS ON STEEL REMELTED IN THE VACUUM-ARC FURNACE. Ogiermann, G. *Ibid.*, pp. 157-161. ($4.90.)

HB 4939 FLUIDITY CHARACTERISTICS OF LIQUID CAST-IRON FLUSHED WITH METHANE GAS. Sofroni, L., *et. al. Studii si Cercetari de Met.*, 1959, (4), 525-35. ($8.70.)

## Craft Training

In *Broadsheet* No. 25 issued by the City & Guilds of London Institute, it is stated there has recently been set up a small committee to consider the possibility of introducing a craft course for foundry apprentices. The aim of such a course would be to provide a nationally-recognized certificate of practical skill and it is hoped that foundry apprentices would welcome such a certificate of craftsmanship. This proposal is still only in the exploratory stage, but it is hoped that the committee will have completed its report early in 1961 when further information will be published.

*International Competition*

It is anounced that the next general International Trade Apprentice Competition (not to be confused with the European Foundry Apprentice Competition) will be held in Duisberg in West Germany during the first half of July, 1961. Once again City & Guilds is providing the necessary administrative help to the British organizing committee which is responsible for the selection of teams to represent Great Britain. Although no final decision has yet been made, it is expected that the following trades will be included in the 20 or more embraced by the competition:—wood patternmaking, machine designing, draughtsmanship and foundry moulding.

Each of the trades is divided into two categories for the purposes of the competition. Category A will be for boys born in 1940, 1941 or 1942 and Category B for boys born in 1943, 1944 or 1945. No country can have more than one competitor in each age category for each trade. The British team will be selected by means of a series of tests which will be held in the second half of April, 1961. Full details will be sent to firms nominating apprentices; such nominations should reach the Institute not later than March 1, 1961.

Each firm can enter one candidate in each age-category in each trade. A fee of £2 for each apprentice entered is being charged to cover the cost of the eliminating contests. Firms participating are responsible for the cost of apprentices' fares, meals on the journey, etc., in respect of both the eliminating contests and the International Competition, but the host Government will pay the expenses of the boys while they are in Duisberg.

*Technical Authorship*

The *Broadsheet* also contains an announcement concerning the new scheme of examinations in technical authorship. Copies of the syllabuses were distributed in the early summer of 1958. The first examination at ordinary level was held in 1960 at 18 centres and of the 113 candidates who submitted themselves for examination, 30 were successful. It seems probable that a large proportion of the candidates were practising technical authors and the result of the examination would appear to indicate that training in this craft will be of great value to the industry. It is hoped that many of the successful candidates at the ordinary examination will proceed to attempt that at advanced level for which the first examination will be offered this year.

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THE DUTCH MOTOR VESSEL "Carebeka" was recently chartered by Danish buyers to lift a cargo of Trimor high-temperature castable refractories, manufactured by Morgan Refractories, Limited, of Neston, Cheshire—a member of the Morgan Crucible group. The consignment, worth £20,000, is destined for use instead of firebricks in the lining of two large power-station boilers in Denmark.

## *Law Cases*

**Fire Precautions Inadequate**

Damages of £4,500—the sum sued for—have been awarded by Lord Walker in the Court of Session to Brown Brothers & Company, Limited, Rosebank Iron Works, Edinburgh, against Lep Transport, Limited, 5 St. Vincent Place, Glasgow. The claim followed the loss through fire of goods belonging to Browns while in the transport company's warehouse in Houldsworth Street, Glasgow. The fire was on January 17, 1957.

Lord Walker said Browns' case was that Lep Transport were in breach of their duty of care in safekeeping. The transport company's contention was that there was a condition that they should not be liable for loss or damage to goods in their custody "unless due to the wilful neglect or default" of themselves.

Lord Walker said that there was no suggestion that the fire reached the premises from any external source. The premises contained a possible cause of fire; the material used for preserving the spare parts and other engineering goods was inflammable. There was no night-watchman and there were no special precautions against fire. Lep Transport had failed to show a *prima facie* case of accidental fire and it followed that they were liable for the loss suffered by Browns.

**Incorrect Tare Weight**

For delivering loads of sand, deficient in weight, to a Yorkshire foundry, a haulage contractor was fined £30 on December 22. He pleaded guilty to six summonses of obtaining a total of £3 4s. falsely by delivering loads of sand deficient in weight to the foundry, and asked for 12 similar cases to be taken into consideration. It was found that road-haulage wagons when unloaded each weighed half a ton more than had been claimed.

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## Second Die-casting Discussion Group

The second of a series of four discussion meetings to be held by the Zinc Alloy Die Casters' Association this winter took place on December 13, at the Hotel Russell, London. The meeting was attended by nearly 100 representatives from member-firms with Mr. R. Turner of Metal Castings, Limited, in the chair. It took as its subject the "Trimming of Die-castings" and the discussion was begun by Mr. R. W. Money and Mr. A. Shaw of the Strebor Diecasting Company, Limited. The opening speakers described the merits and demerits of various trimming techniques and emphasized that die designers and those responsible for modifications must keep in mind the importance of easy trimming.

In the ensuing discussion it became apparent that many members had encountered similar trimming problems and some were able to advise others from their own experience. Several speakers stressed the need for close liaison, both between foundry and trimming shop and between die-caster and customer, if efficient and economical trimming were to be obtained. The chairman took the opportunity of referring to the Association's engineering standards, one of which deals specifically with trimming requirements, and urged members to show their customers the advantages of working to these standards.

The Association will hold two further evening discussion meetings this winter and may later organize all-day symposia. Details will be available from the Zinc Alloy Die Casters' Association, 34, Berkeley Square, London, W.1.

# News in Brief

EIGHT-HUNDRED guests attended the annual staff dance of English Steel Corporation, Limited, at the Cutlers' Hall, Sheffield, on January 7.

A FILM on the manufacture of grinding wheels, made by the Universal Grinding Wheel Company, Limited, was shown in Sheffield on January 11.

E. GREEN & SON, LIMITED, manufacturers of fuel economizers, Wakefield, Yorks, state that the reorganization of the foundry is almost complete.

LUPTON BROTHERS, LIMITED, ironfounders, of Accrington, have taken over the Fountain Mill at Accrington for extensions to their press work and for offices.

REGIONAL OFFICE in Croydon of United Dominions Trust, Limited, moved to new premises in Crown House, North End, on January 9 ('phone Croydon 9204/7).

BORAX CONSOLIDATED, LIMITED, announce that prices of borax and boric acid have to be increased after February 1 by 10s. a ton owing to the advance in ocean freight cost.

DIRECTORS OF RANSOME & MARLES, LIMITED, engineers, Newark, provided a party for 400 children at the works canteen on January 7. The firm's Sports and Social Club organized the event.

RICHARD HILL, LIMITED, OF MIDDLESBROUGH, a member of the Firth Cleveland Group, have moved their Birmingham office from Temple Street to Norfolk House, Smallbrook, Ringway, Birmingham 5.

MISS J. OLDHAM, chairman of the Sports Association of Darwins, Limited, Tinsley, Sheffield, presided at the annual prize distribution on January 13. Facilities at the firm's sports ground are to be extended, it was stated.

BECAUSE OF INCREASING DEMANDS both on administration and servicing departments, the Midland sales and service branch of Atlas Copco (Great Britain), Limited, has moved from Walsall to larger premises at 23, Lombard Street, Lichfield, Staffs.

MR. H. P. FORDER, general manager of Samuel Fox & Company, Limited, Stocksbridge, and a director of the United Steel Companies, Limited, welcomed 200 guests at the annual Press Luncheon given by United Steel at the Grand Hotel, Sheffield, on January 3.

TECHNICAL ASSOCIATION AGREEMENT for the manufacture of electric and diesel locomotives was signed recently between North British Locomotive Company, Limited, and the Government of India. It will run for five years and follows a previous one of a similar nature.

THE 10,669-TON TANKER SAN LEOPOLDO is to be broken up at Blyth by Hughes Bolckow, a subsidiary of Metal Industries group. Built in Oregon for the US War Shipping Administration in 1944, the San Leopoldo was later owned by the Eagle Oil & Shipping Company, Limited.

SUBSIDIARY WORKS of Craven Bros. (Manchester), Limited, at Denton (Lancs), have been sold, together with all the plant, machinery, and equipment therein, to J. Brockhouse & Company, Limited, dropforgers, trailer makers, and ironfounders, etc., of Wolverhampton.

"OVERSEA SERVICE" has issued a prospectus of courses and conferences to be held this year from April to September. People, or their employers, seconded for employment overseas can obtain details of the courses by writing to the London office, 2, Eaton Gate, London, S.W.1.

THIS YEAR Liverymen of the Worshipful Company of Founders are to visit Belgium. The time chosen is May 8 to 11. Headquarters will be at the Amigo Hotel, Brussels. Amongst foundries to be visited are those of Cockerill-Ougree, at Liège, and Les Ateliers Henricot, Court St. Etienne.

SECOND STAGE of the new factory of Solartron Laboratory Instruments, Limited, a member of the Solartron Electric, Limited, group, at Chessington (Surrey) is now under way. It is claimed to be one of the most modern factories in the UK, with fully air-conditioned dust-free atmosphere.

THE GENERAL CHEMICALS DIVISION of Imperial Chemical Industries, Limited, is reducing the prices for the two industrial solvents, trichloroethylene and perchloroethylene. As from January 1, the price of trichloroethylene in the United Kingdom is reduced by £1 per ton and for perchloroethylene by £5 per ton.

MR. J. HILES, principal of Sheffield Technical College presented further education awards to young employees of the Firth-Vickers Stainless Steels, Limited, Sheffield, on January 5. He advised the young people to read as widely as possible, to try to develop a critical judgment, and to complete the courses they had started.

ENGLISH STEEL CORPORATION, LIMITED, in conjunction with their associated company, Firth Vickers Stainless Steels, Limited, will be exhibiting at the Leipzig Fair, to be held in March. Later in the year, the Corporation will exhibit at the British Fair in Moscow together with the parent company, Vickers, Limited.

EMPLOYEES of the Falkirk Iron Company, Limited, entertained their retired fellow-employees to supper and social evening at the end of last year, when a party of 126 gathered in the works canteen. Mr. R. L. Hunter, chairman of the company and managing director of Allied Ironfounders, Limited, northern group, presided.

THE SHEFFIELD BRANCH of the Hunter Archæological Society hopes to erect a plaque in Sheffield City Library to commemorate the death of Joseph Hunter after whom the society is named. Joseph Hunter, who died in 1861 at the age of 78, was one of the most celebrated historians in the district. His most famous work was Hunter's Hallamshire.

AN ORDER WORTH £250,000 received by Euclid (Great Britain), Limited, of Newhouse, Lanarkshire, is for large-capacity rear-dump trucks, to be used in construction projects in Yugoslavia. Euclid broke into the Yugoslav market about three years ago when they obtained a contract worth £500,000. The latest purchase is the largest since the initial order.

THE GLASGOW WORKS of Davy & United Engineering Company, Limited, are sharing in a £1,250,000 contract placed with their Sheffield headquarters by Colvilles, Limited. The contract, for a four-high plate mill for Clydebridge Steelworks, Cambuslang, brings total value of contracts on which the company is now engaged for Colvilles to about £7,500,000.

A TWO-DAY COURSE OF LECTURES on industrial and factory law especially designed for industrial managers and executives, and including the latest legislative changes, will be given by Mr. Harry Samuels, barrister-at-law, at the Industrial Welfare Society's headquarters on February 6 to 8. Particulars can be obtained from the Society, 48, Bryanston Square, London, W.1.

THE NEW "ROADRAILER" VEHICLE of British Railways was shown in operation at the Bridgehouses goods depot on January 3. The vehicle, which can carry up to 11 tons, runs on either road or rail. On the road it is attached to the normal driving portion of an articulated vehicle. For service on rail it is driven into position so that the rail wheels descend on to the lines and the vehicle attached to a train.

UNION CARBIDE INTERNATIONAL COMPANY, New York, USA, is despatching oxide-free ingots due to the protection of a polythene film. One-ton bundles of ingots are stored in large polythene bags from the time the metal is cooled until it is shipped. By controlling moisture condensation on the metal and preventing dirt and dust contamination, the bags help provide the supply of unblemished products to the customer.

ORDERS FOR TWO ORE-HANDLING PLANTS, worth a total of £1,500,000, have recently been received by the General Electric Company, Limited. One of the plants, valued at £1,000,000, is for installation at the Scunthorpe South Works of the Appleby-Frodingham Steel Company, Limited, and the other is for the Ravenscraig Works of Colvilles, Limited. This brings the total value of orders received by GEC for the Ravenscraig Works during 1960 to £2,500,000.

BURNTISLAND SHIPBUILDING COMPANY, LIMITED, has made a flying start to the new year with new orders worth £1,500,000. They are to build a cargo motorship of 10,200 tons dw. for the London shipping company of Stephenson Clarke, Limited. It will have machinery supplied by Doxford's of Sunderland. The builders have also received an order for a 1,600-ton coaster in face of German and Dutch competition; the new vessel will also have British diesel engines by Lister's.

CHARLES D. HOLMES & COMPANY, LIMITED, Hull, have shipped to Bremerhaven what is said to be the largest and most powerful trawl winch built for a trawler. It is electrically-driven and has a motor which generates more than 350 b.h.p., and is to be fitted on the largest distance-water trawler in the world, the Lord Nelson, which has been built for the Lord Line, Limited, of Hull. The Lord Nelson, Britain's first distance-water stern-fisher, was launched on January 14.

EXPORTS go to five continents and 41 countries from General Refractories, Limited, Sheffield, declared the managing director, Mr. John Gregory, at the annual dinner of the Genefax Sports Club, Worksop, on January 6. He said the firm had made a big drive to increase exports, and representatives travelled thousands of miles every week. When the sports club was first formed, 5,000 magnesite bricks was considered to be a large order—now, over 1,000,000 were being produced each month.

A WAGE INCREASE awarded to employees in the light-iron casting industry will mean that adult skilled men working a 42-hr. week will receive an extra 8s. 6d.; other classes, 7s. 9d., and there will be proportionate increases for juniors. For women employees, aged 21 and over, the increase will be 7s. with proportionate increases for juniors. The award, negotiated by the joint committee of the Light Metal Trades Union and the National Light Castings Iron Founders' Federation, became operative on December 26, 1960.

FOUR GIANT ELECTRIC-ARC MELTING FURNACES for the £10,000,000 Rotherham development programme of Steel, Peech and Tozer, Limited, are to be built by G.W.B. Furnaces, Limited, of Dudley, Worcestershire. Each furnace will be capable of melting at the rate of one ton per min., and the electrical demand of the four furnaces will be equivalent to that of a town the size of Wolverhampton. The Steel, Peech Tozer programme will result, it is believed, in the largest electric steelmaking plant in the world. The total output will be 1,135,000 ingot tons of steel per year.

THE HOLMAN GROUP of Camborne, Cornwall, have opened new offices and a showroom at 8, King Street, Bristol, to serve an area comprising: Gloucestershire (east of the river Severn), Wiltshire, Somerset, Dorset and Devon. Manager of the branch is Mr. J. C. Holman, who has been transferred from the Welsh office where he was lately responsible for the Swansea sub-area. Technical representatives are: Mr. J. McBride Fletcher, responsible for Holman and Climax products, Mr. L. J. Gulliford, representing Maxam Power, Limited, and Mr. J. Benny, who will continue to operate from Camborne; the service engineer is Mr. H. Travis. The new office will deal with all Holman Group products including dust-suppression units.

BRIGHTSIDE ENGINEERING HOLDINGS, LIMITED, have announced an extension of facilities for making commercial catering equipment through their subsidiary Moorwoods, Limited, of Sheffield. The latter have entered into an agreement with Vulcan-Hart Corporation of America for a joint enterprise manufacturing a range of equipment based on Vulcan-Hart designs. A new company is to be formed and will operate as a selling organization for Moorwoods and Vulcan-Hart products until production facilities are available. Moorwoods, who have been established for over a century, specialize in commercial cooking equipment. Vulcan-Hart were established in 1865 and claim to be the foremost manufacturers of commercial gas-cooking equipment in the United States.

A TWO-DAY NATIONAL CONFERENCE—"Science and Industry—the Problem of Communication"—is to be held at the Brangwyn Hall, Swansea, on April 18 and 19. Aimed at industry, especially firms in the rapidly expanding industrial areas of Wales, it will deal extensively with the many problems of disseminating research results. It is being organized by the Department of Scientific and Industrial Research, with the assistance of a local advisory committee under the chairmanship of Sir Maynard Jenour. About 300 delegates from industry and industrial research organizations are expected to attend. The conference fee is five guineas, and those who wish to attend are advised to apply without delay to the DSIR Liaison Officer for Wales, Block II, Government Buildings, Gabalfa, Cardiff.

A CONTRACT WORTH £2,250,000 to build rolling mills for the new Tinsley Park works of English Steel Corporation, Limited, Sheffield, has been gained jointly by two Sheffield engineering companies. Davy and United Engineering Company, Limited (a member of the Davy Ashmore Group), and the Brightside Foundry & Engineering Company, Limited (a member of the Brightside Group), have formed a consortium for the work. The contract, for plant designed primarily for quantity production of high-quality alloy and special carbon-steel billets, covers a 42- by 102-in. blooming and slabbing mill, two 32- by 84-in. reversing billet mills and an extensive range of billet finishing equipment. The new plant is expected to be in full operation early in 1963, when billet output will be increased from 130,000 to 380,000 tons per annum.

# Book Reviews

**Choix des Modeles de Fonderie pour Moulage Sable** (Choice of Patterns for Sand Moulding). Report published by Editions Techniques des Industries de le Fonderie, 12 Avenue Raphael, Paris 16; price 11 Nf. (about 17s.).

This is a report of a committee which included leading personalities of the French foundry industry, technical organizations, buyers and designers and master patternmaker associations. The objectives of the publication are (1) to establish a list of the chief types of patterns, coreboxes and their accessories used in foundries, setting out the terms currently in use in this industry; (2) to classify these patterns as related to conditions of manufacture (number-off and desired accuracy, etc.); (3) to help the engineer when a pattern has to be made and (4) to enable the engineer and the founder to speak the same technical language and to foster acceptance of the same types of pattern by the majority of foundries.

The first step has been to classify the patterns into nine types, namely:—(1) patterns for making fewer than five castings only; (2) those for making between five and 20 castings only, and (3) those for runs of 10 to 30 castings, with the possibility of continued use to a maximum of 100 off. These types relate to patterns of moderate dimensional accuracy, including strickle work and skeleton patterns, and requiring in use the employment of skilled moulders. The following categories involve higher production rates, *i.e.*, No. 4 category caters for patterns to produce in batches of 50 or more up to 400 castings; No. 5, in batches of 100 to 1,500; No. 6, batches of 100 to 10,000 (small size); No. 7, batches of 100 to 10,000 (with different dimensional tolerance); No. 8 for those serving for more than 10,000 castings and No. 9 for continuous use, where the construction permits replacement of components, *e.g.*, as they are affected by wear in service.

Good examples, with illustrations, are given for each category stating the type of casting; materials used, make-up accuracy, coreboxes and type of moulder who would be needed to use the equipment in the foundry.

There are two appendices, the first covering type 9—patterns for real mass-production—and the second, an illustrated series of definitions of such items as coreboxes, cope, stripping plates and the like.

The easiest way to have a similar publication in English would be to obtain permission to prepare a translation—whether this should be undertaken by foundry or patternmaking interests is a moot point.

V. C. FAULKNER.

**The Craftsman Engineer,** by Raymond Lister. Published by G. Bell & Sons, Limited, York House, Portugal Street, London, W.C.2; price 15s.

"This book is intended to be neither a textbook nor a manual of instruction; it has been written as a general guide for boys who wish to come into the engineering trade as craftsmen," says the author's preface. This being so, then it is suggested that a title of a more pungent character should have been chosen, such as "Worthwhile Jobs in Engineering for Boys." The book is divided into seven chapters, the first being devoted to apprenticeship. Because industry has many more small concerns than large ones, the author obviously has the former in mind. With the latter, it is not the owner, but the personnel manager, who recruits apprentices and teaching is no longer in the hands of foremen and skilled men, but through schools or in an apprentice training section. Yet what Mr. Lister says still holds good for thousands of cases.

Trades dealt with in the book are those of the blacksmith, machinist, foundryman, sheet-metal worker, welder and fitter. Descriptions of these classes of engineering are put forward in such a way that, in this age of specialization, any boy will be lucky to have contact with the wide variety of work covered, especially in blacksmithing and foundrywork. This is recognized by the author in connection with the latter and he tells of the existence of the National Foundry Craft Training Centre, which unquestionably widens the horizons of a boy working in a specialist's shop. Each chapter finishes with a list of works of reference, very useful to a boy when he has made up his mind. This book would make an excellent prize for schools and colleges to be given by the local engineering and foundry establishments. Moreover, they would be doing that day's "good turn," for the author's royalties from sales of the book are being given to Mr. Peter Scott's broadcast appeal on behalf of children in need.

# Publications Received

**Human Implications of Work-study**—the Case of Pakitt, Limited, by Stuart Dalziel and Lisl Klein. Published by the Human Sciences Unit, DSIR, Warren Spring Laboratory, Gunnels Wood Road, Stevenage, Herts, from whom it is available free on request.

Observation of the effects of work-study on human relationships and day-to-day organization is reported in a case-study published by the Department of Scientific and Industrial Research. It deals with the impact of work-study at all levels in an industrial organization and describes what happened during, and after, the introduction of work-study by consultants into a medium-size Midlands firm. It is a study of change and people's reaction to it.

The application of work-study was not wholly successful, but subsequent analysis of the difficulties encountered revealed that their real cause was neither obvious nor technical—but due to different expectations and basic assumptions of the various groups concerned. For example, the same words and phrases held quite different meanings for different people. Analysis showed that the changes which were introduced involved a closer control of people's activities and they felt under constraint and pressure. Neither the firm's management nor the consultants anticipated this closer control nor did they recognize it when it happened.

While making it clear that it is impossible to draw up a series of "do's" and "dont's" for the introduction of work-study, the report contains a number of useful recommendations. It should be valuable both to industry and for teaching purposes in management courses.

**Soviet Technology Digest, Vol. 1, No. 1.** a monthly magazine. Published by the Pergamon Press, Limited, Headington Hill Hall, Oxford; annual subscription, £10.

There are three articles in this issue of direct interest to foundrymen. One tells of a method of making die-castings by the use of near-pasty aluminium. This method needs larger vent holes in the die but is said to give denser castings, faster production and improved die life. The casting temperature suggested (as a result of the addition of solid metal) is between 540 and 550 deg. C. The second article is about the

(*continued on p.* 92)

*The Foundrymans' dream*

*come true!*

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## *Publications Received*

(*continued from p.* 90)

effect of vibrations on the solidification process, using salt solutions as a method of investigation. The other article referred to describes a computer for calculating what are put forward as being the correct thermal-conditions for cupola operation. The equipment permits the determination of the consumption of fuel, and also the required blast conditions dependent upon the desired temperature of molten iron at the spout, and the degree of completeness of coke combustion. The computer is electrical. It is said to be capable of being operated manually or automatically, and that it represents a contribution to the complete automation of cupola working, following development of an earlier computer for working out the cupola charge. An article on a new low-alloy steel is somewhat vitiated for English-language readers by the retention of the metric system for the mechanical properties reported.

**Health at Work—a description of medical services in 14 British factories.** Prepared by the Ministry of Labour, 8, St. James's Square, London, S.W.1.

Of the 14 factories covered by this report, three are manufacturers of castings. From the descriptions, one does not need to be a Sherlock Holmes to identify two of them. The cost of the installation of a medical service is given in some cases, but obviously the invisible benefits, such as reduction in lost time and consequential gains therefrom, cannot be set out. Undoubtedly these are very important considerations which may easily outweigh the book-keeping debit. The book, which should certainly be carefully studied by all large and medium-size firms, is being widely distributed by HM Factory Inspectorate to factories. From the national point of view, a good medical service within a factory is a great asset.

**Australian Ferrous Forging Industry.** Published by the Commonwealth of Australia, Industries Division, Department of Trade, Canberra.

The Australian ferrous forging industry is producing about 125,000 tons annually, made by more than 170 firms and employing over 5,000 people in all. The bulk of production comes from comparatively few firms—about 80 per cent. is produced by 25 firms and of these six supply 50 per cent. of total production. These are amongst the many illuminating statistics detailed in the brochure which also contains a list of all the manufacturers of forgings.

**Leitfaden für den Kupolofenbetrieb.** (Cupola Operation). Published by Giesserei Verlag G.m.b.H., 27 Breite Strasse, Düsseldorf, Germany; price 7.20 DM (about 12s.).

This book is a German translation of the "Guide Pratique de Conduite des Cubilots" a French publication on cupola operation produced by the *Centre Technique des Industries de la Fonderie*. It will make a useful contribution to the German literature on this subject.

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A SURVEY of nickel and chromium recovery in the electroplating industry, by E. P. Harris, has been published by the Department of Scientific and Industrial Research, and is obtainable from the Library Department, 5 to 11, Regent Street, London, S.W.1, free of charge.

## *Catalogues*

**Die-castings.** Using the title "Problems in Metal," Thomas Ashworth & Company, Limited, Burnley, Lancs, have issued a most interesting brochure showing how commonsense design can bring in new work for the foundry and expand and improve existing lines. It is pleasing to see that this firm takes "its own medicine" and amongst the many case-histories reviewed in the publication is the clamp screw for the company's "Speedy" moisture tester. This was originally made as a brass component but is now manufactured as a zinc-base die-casting. It can be said without hesitation that the components the firm have re-designed in every case show improvement of appearance in addition to economic advantages. It is a provocative type of publication well worthy of emulation by the foundry industry as a whole.

**Water Pumps.** Publication No. 1/529 issued by Ransomes & Rapier, Limited, Waterside Works, Ipswich, Suffolk, describes a range of self-priming water pumps, capable of handling water containing up to 25 per cent. solid matter in suspension. Many foundry concerns have pumping stations for the supply of their own water or for use in times of emergency, and this catalogue illustrates and describes the types of plant suitable for these purposes. A second catalogue, No. 1/530, deals with ships' emergency fire pumps.

**Welding Rods:** In the revised edition of their price list, the Suffolk Iron Foundry (1920), Limited, Stowmarket, shows that during the past 12 months two additions have been made to the company's wide range of products. Included in the list for the first time are two new rods:—Silver Solder No. 38 which has a low melting point of 620 to 640 deg. C., and Sifcut No. 40, a composite rod of tungsten-carbide particles in a nickel Sifbronze matrix.

**Automatic Moulding Plant.** Rubery, Owen & Company, Limited, Empress Works, Walsall Road, Willenhall, S. Staffs, have produced a spirally-bound, 40-page brochure which makes good use of colour printing. It carries a clear, well-illustrated description of the Hallsworth automatic castings manufacturing plant, and covers all the component parts of this unit. It is interesting to note that the plant is to be shown at the British Trade Fair to be held in Moscow during this summer.

**Engineering Products.** In publication G4/2E, the English Steel Corporation, Limited, River Don Works, Sheffield, give an illustrated description of the products which they make for the marine engineering, shipbuilding, aircraft, automobile, railway, electrical, mining and general engineering industries. In the section devoted to castings, the wide range manufactured is indicated by illustrations of components weighing from a few pounds to 185 tons.

**Firebricks.** In publication No. RD96, Morgan Refractories, Limited, Neston, Wirral, Cheshire, detail the uses, chemical composition and physical properties of eight brands of firebricks made by their associated company, the Douglas Firebrick Company.

**Air Blowers.** In publication No. 85, W. C. Holmes & Company, Limited, Turnbridge, Huddersfield, describe a number of modifications and improvements which have been made to the Holmes-Connersville positive air blowers, type RBS.

LSR 81 Grinder at work on a heavy casting

# COMPRESSED AIR for the FOUNDRY

Atlas Copco puts compressed air to work for industries of every class—light, medium and heavy. For foundry work there are Atlas Copco rammers, chipping hammers and grinders carefully balanced to reduce operator fatigue and ensure the best possible results. For example, rammers are designed to "walk" with a minimum of guidance, allowing the operators to give all their attention to tamping.

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Atlas Copco heavy duty grinders are easier, less tiring to use. They combine maximum power with minimum size and weight and are designed for the quietest possible operation. Special safety governors ensure constant speeds regardless of varying loads. These grinders open the way to increased output; with Atlas Copco R-type chipping hammers they form a range of robust, reliable tools for all types of fettling and dressing operations.

**Air hoists — accurate to a fraction !**

For ultra-sensitive control, Atlas Copco air hoists are in a class of their own. Their infinitely variable speeds permit loads to be placed with ease and accuracy. The air motors are fully protected and the hoist can be operated with complete safety in any atmosphere — hot, dusty, damp, explosive or corrosive.

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With companies or agents in ninety countries, Atlas Copco is the largest organisation in the world specialising solely in compressed air equipment. Products include stationary compressors from (2.5 to 20,000 c.f.m.) ·08 to 566m³/m portable compressors, air tools, rock drills, loaders and paint-spraying equipment. Wherever you are, the international Atlas Copco group offers expert advice and provides a complete after-sales service.

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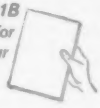
*This catalogue presents a selection of Atlas Copco Equipment for industry (including the foundry trade). Write for a copy to your local Atlas Copco company or agent or to the address below.*



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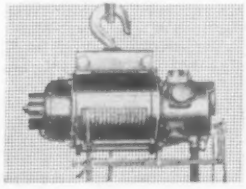

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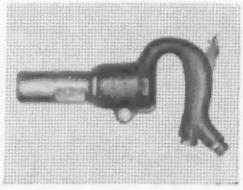

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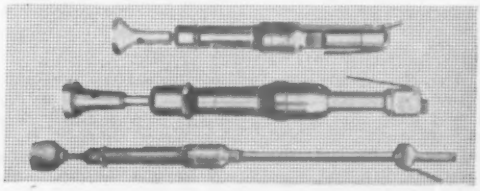

STR2

# Raw Material Markets

## Iron and Steel

Production of all grades of pig-iron continues at recent high levels, and adequate supplies of ore, coke and other raw materials are available at the furnaces. The steelworks maintain their usage of the major portion of overall outputs in basic pig-iron, and current supplies are sufficient to satisfy both consumption and stock requirements. The iron foundries are also well placed for supplies in all grades of pig-iron used by them. The low phosphorus irons continue to be in greatest demand, and although one or two brands are still limited in production, overall outputs from the several furnaces now producing this type of iron are adequate to meet present demands, and some furnaces could step up deliveries if required to do so. Hematite and refined irons are also in good supply.

The foundries using the high phosphorus irons have no difficulty in covering for their needs, and producers have tonnages to spare from both stocks and current outputs. These excess supplies are available for customers overseas as and when orders can be obtained against the strong competition from makers abroad. Overall production of castings is at reasonably good levels, although for some establishments the trend of business continues uncertain. This position applies particularly to the engineering and speciality foundries which cater mainly for high quality castings for the motor car industry, whose demands are insufficient to enable these foundries to maintain a normal working week. On the vehicle and tractor side of the trade there has been little deterioration in demand, and their usage of castings together with those of many other trades, is at a good level.

In the light casting industry there is need for much more work and the light foundries supplying to the domestic utensil trades are especially under-employed. The foundries catering for the building trades are reasonably buoyant, but for light castings generally the demand is much below that required to keep plants occupied at capacity levels. The jobbing and textile foundries are fairly well engaged, but more work could also be undertaken by them.

Arisings of the better grades of both cast-iron and steel scrap are limited, and many foundries are anxious to obtain increased supplies. Special grades of scrap are scarce. Foundry coke deliveries are satisfactory and ganister, limestone, and firebricks are available on demand.

Although demands for the products of the re-rollers is not now so heavy, the mills continue well occupied on small steel bars and light sections and the call for reinforcing rods is maintained at good levels. The re-rollers are well provided with mild steel semis. Most of them have fairly good stocks, which are being replenished as required by supplies from home steelworks. The difficulty in obtaining adequate tonnages of carbon and alloy steel billets shows little improvement. The re-rollers are readily accepting all arisings at the steelworks of suitable defectives and crops.

## Non-ferrous Metals

The present blurred economic outlook on both sides of the Atlantic and the cutback in production and employment in the UK automobile industry had already exerted its depressing influence on the London copper market, so that when the El Teniente strike was suddenly and surprisingly averted last week, the price structure virtually collapsed. The strike situation was acting as the main prop to the market; now that it has disappeared, the outlook is cheerless to say the least. The present position is that buying is of a routine nature and purchases made are to cover immediate requirements. Under these conditions the LME prices are sagging and it is only dealer covering which is slowing down the fall in the quotations.

Although the disturbed situation in Katanga may yet directly affect the production and shipment of copper from the UMHK mines, the London market has not yet recognized this possibility. Nor, does it appear, have the Belgians who have reduced their price for electrolytic copper in bars to 30¼ Belgian francs per kilo from 31¼ Belgian francs. In the US, business is still very quiet and the custom smelters have lowered their price by 1 cent to 29 cents a pound. US domestic producers have not, however, budged from their quotation of 30 cents a pound.

The tin market in London has lost its momentum and the price is fluctuating around £780 a ton, the point at which the buffer stock manager can intervene to support the market. This action would seem to be opportune, if deemed necessary, as the buffer stock only holds 10,000 tons at present and further purchases could be easily absorbed. The cause of the present weakness can be traced to the cutback in the production of tinplate by the Steel Company of Wales, Limited, and it is to be noted that the favourable statistical outlook for the metal described by "experts" did not take into consideration any drop in UK consumption. On the other hand, Singapore has maintained a steady appearance with the New York market varying from quiet to quietly-steady. It will be interesting to observe what the buffer stock manager does in the present circumstances. Meanwhile, the New York price is well below $1.01 a pound.

Zinc has been a confused market owing to the lack of any co-ordination in the US price structure. There, the St. Josephs Lead Company announced that it would offer a small discount on the recognized price of 11½ cents a pound in order to attract more business. This led to other companies saying they would meet any discount competition and the "lead war" seemed to be on. But at the end of last week St. Joseph came out with the statement that they would no longer offer any discount and the US market is now settling down into its previous rut. The London market has also been weak with the price still below £80 a ton.

Lead in London is a reasonably steady market at the present depressed price levels, but the oulook continues bleak. The same comment applies to the US market where its price is still called at 11 cents a pound.

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# Board Changes

STEWARTS AND LLOYDS OF SOUTH AFRICA, LIMITED—Mr. W. L. Morrison has joined the board.

HALESOWEN STEEL COMPANY, LIMITED—Mr. C. S. Burch has retired as chairman and from the board due to ill-health.

WILLIAM ASQUITH, LIMITED—Mr. J. Atherton has joined the board as director and chief engineer. Mr. A. Johnson is relinquishing his position as chief engineer, but will remain a director and act as consultant.

BRITISH ALUMINIUM COMPANY, LIMITED—Permanent Secretary to the Ministry of Supply, Sir William Strath, is to leave the Civil Service to join the board as from February 1. Mr. James Richie, financial director, has resigned from the board and from his other directorships within the group, to take up another appointment.

## Baker Perkins Foundry Machinery at work... *at the Southend Engineering Co. Ltd.*

This Baker Perkins Girojet Universal Shot Blasting Machine operates without compressed air, needs negligible maintenance and costs little to run. And here's another advantage—no foundations are needed. The Girojet will take an evenly distributed load of 500 lbs. Average shotblasting times: aluminium (2-4 minutes); grey iron (3-6 minutes); malleable cast iron or bronze (4.5-8 minutes); forged steel or stamped steel (10-20 minutes).

This is the machine that completely replaces the hand cabinet.

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HISTORICAL NOTE

*Southend Engineering Company was established in 1901, and manufactured Marine and Stationary engines until 1914. The Firm has produced its own non-ferrous castings since 1938. They manufacture the "Viking 3" Outboard Motor, a set of flame guns for agricultural purposes, and a range of Stern Gear and fittings for marine engine manufacturers.*

BP/F10

# Current Prices of Iron, Steel, and Non-ferrous Metals

*(Basis prices, delivered unless otherwise stated)*

January 18, 1961

## PIG-IRON

**Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

**Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

**Cylinder and Refined Irons.**—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

**Refined Malleable.**—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

**Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; Wales (Welsh iron), £23 19s. 0d.

**Basic Pig-Iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

## FERRO-ALLOYS

*(per ton unless otherwise stated, delivered)*

**Ferro-Silicon** (6-ton lots and over).—45 per cent. Si. £43 10s. 0d. to £46 0s. 0d., scale 15s. 0d. per unit, lumpy. 75 per cent. Si, £60 0s. 0d. to £63 10s. 0d., scale 15s. 0d. per unit, lumpy.

**Ferro-vanadium.**—50/60 per cent., 22s. 6d. per lb. of V.

**Ferro-molybdenum.**—65/70 per cent., carbon-free, 12s. 10d per lb. of Mo.

**Ferro-titanium.**—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

**Ferro-tungsten.**—80/85 per cent., 11s. 6d. per lb. of W.

**Tungsten Metal Powder.**—98/99 per cent., 14s. 6d. per lb. of W.

**Ferro-chrome** (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

**Metallic Chromium.**—98/99 per cent., 6s. 10d. per lb.

**Metallic Manganese.**—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

**Ferro-columbium.**—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

**Ferro-manganese** (Standard).—78 per cent., £61 10s. 0d.

## SEMI-FINISHED STEEL

**Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons & over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C, £40 11s. 0d.; silico-manganese, £43 4s. 0d.

**Billets, Blooms, and Slabs for Forging and for Stamping** (50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

* Average 68-70 per cent.

## FINISHED STEEL

**Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

**Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 18s. 0d.

**Alloy Steel Bars.**—1 in. dia. and up: Nickel, £66 7s. 0d.; nickel-chrome, £97 1s. 0d.; nickel-chrome-molybdenum, £109 14s. 0d., in lots of 25 tons and over.

## NON-FERROUS METALS

**Copper.**—Cash, £221 5s. 0d. to £221 15s. 0d.; three months, £221 5s. 0d. to £221 10s. 0d.; settlement, £221 15s. 0d.

**Copper, Tubes, etc.**—Solid-drawn tubes, 2s. 1¾d. per lb.; rods, 232s. 6d. per cwt. basis; 20 s.w.g., 267s. 6d. per cwt.

**Tin.**—Cash, £784 0s. 0d. to £784 10s. 0d.; three months, £787 10s. 0d. to £788 0s. 0d.; settlement, £784 10s. 0d.

**Lead (Refined Pig).**—Second half January, £64 10s. 0d. to £64 15s. 0d.; second half April, £65 15s. 0d. to £65 17s. 6d.; settlement, £64 15s. 0d.

**Zinc.**—Second half January, £79 10s. 0d. to £79 15s. 0d.; second half April, £79 0s. 0d. to £79 2s. 6d.; settlement £79 15s. 0d.

**Zinc Sheets, etc.**—Sheets, 15g., and thicker, all English destinations, £115 15s. 0d.; rolled zinc (boiler plates), all English destinations, £113 10s. 0d.; zinc oxide (Red Seal) d/d buyers' premises, £95 0s. 0d.

**Brass Tubes, etc.**—Solid-drawn tubes, 1s. 9d. per lb.; sheets to 10 w.g., 190s. 3d. per cwt.; wire, 2s. 7½d.; rolled metal, 190s. 3d. per cwt.

**Brass (Brazing).**—BS1400, B3, £171; B6, £218.

**Brass (High Tensile).**—BS1400, HTB1, £191; HTB2 £208; HTB3, £227.

**Gunmetal.**—BS1400, LG2, £213; LG3, £222; G1, ½% £285; G1, 1%, £273.

**Phosphor Bronze.**—BS1400, PB1 (AID released), £301; BS1400, 90/10/1, £289.

**Leaded Phosphor Bronze.**—BS1400, LPB1, £234.

**Phosphor Bronze Strip, etc.**—Strip, 276s. 0d. per cwt.; wire, 3s. 11¾d. per lb.; rods, 3s. 2½d.; tubes, 3s. 2½d.; chill cast bars, solids 3s. 2d.; cored 3s. 3d. (CHARLES CLIFFORD LIMITED).

**Nickel Silver, etc.**—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 9¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 2¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 1s. 1½d. All prices are net.

**Other Metals.**—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £69 0s. 0d. Nickel, £800 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £239; AB2, £247.

## The Late Alfred Campion

As briefly announced last week, Alfred Campion has died in his 87th year. He occupied the chair of metallurgy at the Glasgow Technical College, now the Royal College of Science and Technology. In 1903, he was awarded the Carnegie Gold Medal by the Iron and Steel Institute, being the second person ever to receive that distinction. The branch of metallurgy in which he took most interest was unquestionably that of cast iron, an interest he retained throughout his life. He also did much to foster the Scottish branch of the Institute of British Foundrymen which he helped to establish in 1910. He became president and thereafter was prominent in the affairs of the Institute. His contributions to the progress of the industry and the Institute were recognized by the awards of the Oliver Stubbs Medal and honorary membership. In 1935, shortly after the establishment by Mr. Oliver Smalley of the International Meehanite Metal Company, Limited, in this country, Mr. Campion was appointed consultant and paid visits to foundries all over the country. One of his last public appearances was as recent as April, 1960, when he addressed a large gathering of foundrymen assembled to honour the golden jubilee of the IBF Scottish branch. In his long life, he made a host of friends and it was always a pleasure for them to hear him tell of great personalities he knew, the technical developments in which he had participated and to learn his views on the future of the industry. His quiet, charming personality will long be missed, especially among the older generation of foundrymen.

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STEWARTS AND LLOYDS OF SOUTH AFRICA, LIMITED—Mr. W. L. Morrison has joined the board.

## *Obituary*

Mr. ARTHUR RADFORD, a former commercial manager at the Codnor Park forge and rolling mills of Butterley Company, Limited, died in Mansfield General Hospital at the age of 68.

The death has occurred of Mr. JOHN SLATER, a former director-secretary of Fleming & Company (Machinery), Limited, Robertson Street, Glasgow. He had been with the firm more than 50 years.

The death occurred on January 1 of Mr. A. EDWARDS who, before his retirement in February last year, was manager of the architectural foundry department of H. H. Martyn & Company, Limited, Sunningend Works, Cheltenham. He was in the service of the company for over 40 years.

Mr. RONALD J. SHANKS, joint managing director of Shanks & Company, Limited, sanitary engineers, Barrhead, Renfrewshire, has died in a London nursing home at the age of 67. He was a grandson of the founder of the firm.

Mr. J. V. RODGERS, who had been consulting electrical engineer for Newton Chambers & Company, Limited, Thorncliffe, Sheffield, until his retirement three months ago at the age of 65, has died. He was with the firm for 45 years, and held the position of chief electrical engineer from 1945 to 1959.

Mr. E. F. WATSON, aged 51, a director of Efco Furnaces, Limited, died on December 30 as a result of a road accident. He joined the company—then called Electric Resistance Furnace Company, Limited—in 1933 after serving an apprenticeship in the heavy engineering works of John M. Henderson & Company, Limited, of Aberdeen. He was for many years sales manager and was appointed to the board in 1955.

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# CLASSIFIED ADVERTISEMENTS

**PREPAID RATES:** **Twenty words for 10/– (minimum charge) and 4d. per word thereafter. Box numbers 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.**

**Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.**

## SITUATIONS WANTED

FOUNDRY MANAGER, 48, with technical ability and a wide practical knowledge in all aspects of the Foundry trade, technical liaison, estimating, plant layout and purchasing, etc. Willing to travel anywhere. Box FM539, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, having ideal practical, technical and commercial experience, seeks opportunity to control small to medium size jobbing foundry. A time served moulder with good record in management. Cost-conscious and with modern outlook. Personal contacts and selling experience could bring new work. Box FM534, FOUNDRY TRADE JOURNAL.

FOUNDRY TECHNOLOGIST (28). National Foundry College Diploma, City and Guilds Foundry Practice, Patternmaking apprenticeship, desires progressive position in London area or Southern England. Experienced in light and medium grey iron, mechanised and jobbing work, including $CO_2$. Box FT544, FOUNDRY TRADE JOURNAL.

FULLY qualified FOUNDRY METALLURGIST available for short-term consultant work, wide experience mechanised and non-mechanised ferrous and non-ferrous foundries. Box FQ550, FOUNDRY TRADE JOURNAL.

MANUFACTURER'S AGENT operating in the Midlands with excellent connections amongst all classes of engineering, would be pleased to hear from a Foundry—repetition or jobbing—requiring representation on an agency basis in the Midland counties. Box MA551, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN (36), Higher National Certificate, City & Guilds Diploma, seeks position with improved prospects. Skilled in all aspects of iron founding. Salary £1,150—£1,500. Box FF533, FOUNDRY TRADE JOURNAL.

## SITUATIONS VACANT

DRAUGHTSMAN ESTIMATOR/PLANNING ENGINEER with experience of Aluminium and Zinc Pressure Die-casting required by progressive Company in North-West London. Permanent monthly staff appointment and Pension Scheme. Substantial salary to a fully-qualified man. Apply in writing, giving details of education, experience, etc., to the PATENT DIE-CASTINGS CO. LTD., 52 Strode Road, London, N.W.10.

REPRESENTATIVE REQUIRED, preferably man already calling on Foundries in the Midlands and the South. Must be experienced in Foundry practice and techniques, and be able to advise customers on the use of Studs and Chaplets. Good opening for a man with the right experience. Write, giving full details to Box RR542, FOUNDRY TRADE JOURNAL.

## SITUATIONS VACANT—*contd.*

SERVICE ENGINEER required by well known Foundry Equipment Manufacturers. Preference given to applicants residing in the South West Midlands or Birmingham-Coventry area. Non-contributory pension scheme. Write stating age and full details of past experience to Box ER527, FOUNDRY TRADE JOURNAL.

SENIOR FOREMAN required for large Non-ferrous Foundry in Home Counties, manufacturing wide range of Bronze and Light Alloy Castings. Must have experience in production of heavy Bronze and Gunmetal Castings by machine and floor moulding methods. Good salary. House available. Box SF536, FOUNDRY TRADE JOURNAL.

**Advertisers** whose announcements appear under a box number are urged to acknowledge, however briefly and informally, all replies received. This particularly applies to advertisements under "Situations Vacant"; serious inconvenience and, sometimes, real hardship can be caused to applicants who receive no indication even of the safe receipt of their communication. Failure to acknowledge replies can also reflect on the good faith of this journal, which is responsible for their onward transmission. If it is desired to maintain anonymity, an acknowledgement on plain paper, quoting the relevant box number, is all that is necessary.

## SITUATIONS VACANT—*contd.*

FOUNDRY FOREMAN, age 30-45, required by expanding Iron Foundry in East Lancashire. Applicants should have sound technical and practical foundry experience, coupled with first rate supervisory ability, drive, and initiative. Prospects excellent. An attractive salary and pension scheme offered to successful applicant. Write giving full personal details and experience to Box FF540, FOUNDRY TRADE JOURNAL.

FOUNDRYMAN required by old established Engineering firm in East Anglia; pleasantly situated in small country town within a few miles of the sea. The successful applicant will be required to take control of the Iron Foundry and to be responsible for estimating, fixing piece work prices, quality of metal and production. Please apply in writing, quoting age, experience and salary required, to the ASSISTANT GENERAL MANAGER, Box FR537, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER required for old established Iron Foundry producing high quality repetition castings. Good salary will be paid to man with vision and sound practical and technical experience. The foundry is almost fully mechanised and capable of producing 250 tons of castings weekly. Box GM530, FOUNDRY TRADE JOURNAL.

PATTERNMAKERS (wood and metal) required. Excellent wages and plenty of overtime. Permanent positions. STANDARD PATTERN CO. LTD., 25a Broadwall, Stamford St., S.E.1. WAT 6875.

# PRODUCTION ENGINEER

*required for Precision Casting Division of*

***FAIREY AVIATION LIMITED at Hayes, Middlesex.***

Applicants should have sound technical education and executive experience in economic manufacture preferably including precision casting. Ability in the development of plant, works layout, tooling facilities and manufacturing and handling methods can be used to make this appointment one with excellent prospects. First-class pension and life-assurance schemes.

Convenient location with easy access to London or country. Apply with concise summary of education, training and experience to the

*Personnel Manager*

**Fairey Aviation Limited, Hayes, Middlesex.**

*(A Division of Westland Aircraft Limited)*

## SITUATIONS VACANT—*contd.*

PATTERN MAKERS required for small Master Shop situated in the pleasant City of Rochester, 50 minutes from London, 30 minutes Kentish Coast. Good wages according to ability. CHARLES MANN & SONS, Ross Street, Rochester.

FOUNDRY MANAGER required for modern Iron Foundry employing 50 hands. Green sand and dry sand by $CO_2$ process. Knowledge of alloy and high duty irons an advantage. Write in confidence, giving fullest details, age, experience, salary required, to MANAGING DIRECTOR, Frederick Parker Limited, Catherine Street, Leicester.

STEEL FOUNDRY in North of England requires ESTIMATOR, capable of extracting weights from drawings, and knowledge of Methods an advantage. This is a staff appointment. Write stating age, experience and salary required to Box SF554, FOUNDRY TRADE JOURNAL.

FOREMAN for modern fettling shop handling a large variety of small and medium size repetition castings. Must be a good organiser and fully familiar with fettling operations. Staff position with good pension scheme. SHOTTON BROS., LIMITED, Lodgefield Road, Halesowen.

**CHIEF INSPECTOR**

Interesting position for qualified man 35-45. Must be A.I.D. (Class 1). Interpretation of X-Rays etc., essential, able to assist in the Mechanical Inspection of machined components for small high precision non-ferrous Foundry. Wembley/Alperton, Middx. Area. Box CI 549 FOUNDRY TRADE JOURNAL.

IRONFOUNDERS manufacturing Domestic Appliances (Manchester area) offer opportunity to keen young foundryman starting as ASSISTANT to Foundry Foreman for further training to managerial level. Applications, stating age and giving full details of experience to date, should be addressed to Box IM543, FOUNDRY TRADE JOURNAL.

### FOUNDRY ESTIMATOR

FOR West Bromwich, required, with technical training to National Certificate level or good education to Ordinary G.C.E. standard. Able to read drawings and some experience of foundry practice, preferably of foundry estimating. Good welfare, sports and social facilities and non-contributory pension scheme. Write giving full particulars to:

**Personnel Manager,**
**ALFRED ELLISON LIMITED,**
**Perry Barr, Birmingham 22B.**

### FOUNDRY FOREMAN

YOUNG MAN, preferably with National Foundry College Diploma, required by Thomas Potterton Ltd. (De La Rue Group). Should be experienced in all aspects of modern foundry practice. The Company is in the forferont of an expanding industry (central heating) and prospects and conditions of employment are excellent. Please write, giving details of age, experience and salary required to PERSONNEL OFFICER, THOMAS POTTERTON LTD., Emscote Road, Warwick.

METALLURGIST (young qualified) required for Investment Casting Foundry in Midlands. Experience of steel investment casting essential. Good prospects and salary. Write, giving full details of age, qualifications, previous posts held, etc., to BOX MY507, FOUNDRY TRADE JOURNAL.

SAND TECHNICIAN required for heavy Iron Foundry in South Wales. Good working knowledge of naturally bonded and $CO_2$ Sands and Air Setting Core Oils, G.C.E. in Science subjects. Age 25/35. Staff Position. Contributory Pension Scheme. Apply in writing to the "PERSONNEL OFFICER," Guest Keen Iron & Steel Co., Ltd., Ivor Works, Dowlais, Merthyr Tydfil.

A FOUNDRY TECHNICIAN is required for a medium sized Foundry. Applicants should be between the ages of 30 and 35 years; they must have had a good basic technical training and experience in the production of superior quality grey iron and Blackheart Malleable Iron Castings in a mechanised foundry. Experience in the production of chilled Grey Iron Castings would be an advantage. The prospects for a reliable, energetic and capable man are very good. Salary will be in accordance with capability and experience. House can be made available if necessary. Applications, which will be treated in confidence, should be addressed to THE TECHNICAL DIRECTOR, Shanks Ironfounders Ltd., Dens Iron Works, Arbroath.

APPLICATIONS are invited from persons with suitable experience or technical qualifications to be responsible for Quality Control activities in a Foundry producing steel and high alloy castings by the Lost Wax and Shell Moulding techniques. The successful applicant will be expected to exercise his ingenuity in developing new techniques and improved methods of manufacture. Applications with full details of education, qualifications and experience to be sent in confidence to the PERSONNEL MANAGER, HADFIELDS LTD., East Hecla Works, Vulcan Road, Sheffield, 9. This is a repeat advertisement. Applications received in response to the previous advertisement will receive further consideration.

METALLURGIST required for Grey Iron Foundry in the Birmingham area to control cupolas, metal and sand mixes in medium sized foundries producing castings for the machine tool industry. Salary in accordance with qualifications and experience. Write full details of experience and present salary. Age 35 to 40 preferred. BOX MR535, FOUNDRY TRADE JOURNAL.

## ASSISTANT TO FOUNDRY MANAGER

required by

**GEORGE GARNER AND SONS LTD.**

**A subsidiary of W. E. Sykes Limited**

The Manager of a medium-sized foundry, producing ferrous castings up to 30 tons chiefly for the machine tool industry, requires an assistant who has had good practical experience with technical knowledge of similar work. He will be required to handle enquiries, quotations and technical correspondence and to take charge of the foundry in the Manager's absence. Age range 30 to 45. Good salary and prospects offered a suitable applicant.

Send full details of technical training, present and past employment and other relevant information, in strict confidence to—

**THE SECRETARY,**
**GEORGE GARNER AND SONS LIMITED,**
**CANAL FOUNDRY, VICTORIA STREET, MANCHESTER 11.**

## *Foundry Superintendent*

for large well-equipped Foundry producing Grey Iron castings, together with small quantities of non-ferrous castings.
Sound knowledge of Foundry technology is essential (sand control, metallurgical analysis, etc.), together with wide practical experience, preferably including shell and core methods.
Applicants must have had supervisory experience at a senior level and be in the 35–40 age group.
Full details of age, qualifications, experience and salary required to:

NORTHROP

*The Personnel Manager,*
**BRITISH NORTHROP LIMITED,**
BLACKBURN, LANCS.

## MACHINERY WANTED

BRITISH Moulding Machine type HPL 1 or 2 required, preferably in good working order, but minor repairs not objected to. Box BM547, FOUNDRY TRADE JOURNAL.

WANTED, Split Moulding Boxes, 30 in. × 24 in. × 4 in. each half and 39 in. × 12 in. each half. DREWERY, DERWENT FOUNDRY, Pocklington.

PLAIN Jolt Machine, minimum size of table 42 in. × 30 in. or larger. Also about 100 ft. run of roller-track, width 18 in. (rollers). And one Cupola approx. 51 in. dia. outside shell. Box PJ548, FOUNDRY TRADE JOURNAL.

WANTED.—"Wadkin" Pattern Miller, "LQ" Recessor, Disc and Bobbin Sander, Dimension Sawbench, Spindle Moulder. Good prices paid for modern machines. "LONG MEADOW," Manor Lane, Whatton, Notts.

WANTED. Good light alloy furnace up to 500 lb. brass. Any type considered. Box WG545, FOUNDRY TRADE JOURNAL.

## MACHINERY FOR SALE

SAND MIXERS and DISINTEGRATORS for Foundry and Quarry; capacities from 10 cwts. to 10 tons per hr.—W. & A. H. BRAILEY (MACHINERY), LTD., Misterton, nr. Doncaster. Tel.: Misterton 202.

SPENCER & HALSTEAD "Centriblast" Machine, 36 in. dia. × 42 in. chamber. 6 cu. ft. capacity. 440-50-3 phase Motors with Starters. This machine has never been used. As supplied by makers. £500. Cost £1,100. Box SH553, FOUNDRY TRADE JOURNAL.

### MOULDING MACHINES

ZIMMERMAN Pneumatic. Jolt Squeeze Turnover Vibrate.
17 Type RPW1 20½ in. × 16 in.—draw 9 in.
1 Type RPW2 36 in. × 20 in.
Zimmerman Pneumatic. Jolt Squeeze Vibrate.
5 Type FR1 22 in. × 19½ in.—Pin Lift 4½ in.
1 Type FR2 28½ in. × 22 in.—Pin Lift 4½ in.

### CUPOLA FURNACES

No. 4 Roper Economic Cupola with Spark Arrestor—3/3½ tons grey iron per hour. Overall height 41 ft., 3 ft. 6 in. outside dia., 2 ft. dia. inside lining at tuyères. 1948. Very good condition.
Second Furnace with Spark Arrestor—Overall height 42 ft., 4 ft. 6 in. outside dia., 3 ft. 6 in. outside dia. chimney, 2 ft. 4 in. inside lining at tuyères. Fair condition.

**ENTWISLE & KENYON LIMITED**
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Large Stock of Geared Ladles up to 8 tons capacity.
Several Roper Ladles and Roper Ladle hoists.
British Moulding Machine, size A.T.3.
Morris Screenerator, nearly new.
New Bale-out and Lift-out Furnaces. Please send for illustrated leaflet.
Sinex Knock-out Beam. 5-Tons capacity.
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Cummings oil sand mixer.
New Suspended electric sieve.
Luke & Spencer 24in. double-ended high speed Fettling Grinder, with three speed, independent drive, standard A.C. 3 phase.
King 2-ton Electric hoist.

**ELECTROGENERATORS LTD.**
**Australia Road, Slough, Bucks.**
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**Roper**
**LADLES**
**STOCK UP TO 5TON CAP.**
**E. A. ROPER & CO. LTD.**
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## MACHINERY FOR SALE—*contd.*

"WADKIN" Model "RS" 8-in. Centre Motorized Gap Bed Woodturning Lathe, travelling slide tool carriage, outside turning. DALTONS, Canal Street, Nottingham.

**ITWW**

BM2 SAND MILL by Foundry Equipment, cap. 4 tons per hour, electrics 365/3/50 cycles.
New Guyson Shot Blast Cabinet, 42 in. × 30 in. × 36 in. Complete with Dust Collector and Extraction Unit. 400/440/3/50 cycles supply electrics.
Wallwork WT563C Shockless Jolt Squeeze Straight Draw Moulding Machine.
BMM type RD2 Turnover Jolt Squeeze Moulding Machine Table, 36 in. × 25 in.
BMM Type BT5 Jolt Squeeze Turnover Moulding Machine, table 36 in. × 28 in.
Coleman Wallwork Type WT562C Shockless Jolt Squeeze Turnover Moulding Machine, Table 35 in. × 24 in.
Climax 80E Stationary Air Compressor, 320 c.f.m., 100 lb. p.s.i. with 90 h.p. Brook Motor and Starter.
Hexagon Steel Rumbler, 48 in. × 30 in. across flats. Reduction Gear drive and motor.
Shot Blast Plant, Rumbling Barrels, Furnaces, Air Compressors, available from stock.

**THOS W. WARD LTD.**
**ALBION WORKS : SHEFFIELD**
**'Phone. 26311 Ext. 307**

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**SPECIAL OFFER**
**Modern Cupola Installation**
comprising :—
Two 3 ton capacity Cupolas,
wet spark arresters,
drop bottom swivelling charging bucket,
blowing fans, etc.
Can be inspected in situ and is available at an attractive price loaded on to vehicle.
*Further details from—*
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**Ex stock or prompt delivery.**
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*Try us for*
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## MACHINERY FOR SALE—*contd.*

FREE INSTALLATION OFFER. 300 lb. oil fired bale-out Furnace in good condition.
£110 (only two available).
Also 150 lb. lift-out oil or gas fired and 200 lb. coke.

**K. A. LEARMONTH, LTD.,**
**31, Panmure Road, S.E.26**
**FOR 1618**

30-CWT. Monometer Oil-fired Rotary Furnace with burner, blower, control panel, recuperator, exhaust box and chimney: little used, seen erected.
"Ace" Skip Hoist complete with side-tipping skip—easily modified to make Cupola charger. Height of lift approx. 20 ft. (could be adjusted). Capacity approx. 10 cwt.
Vaughan 1-ton capacity hand-operated Lifting Blocks push-travel.
Broom & Wade Air Hoist Block wire rope, height of lift approx. 20/22 ft.

**S. C. BILSBY & CO.**
**Hainge Road, Tividale, Staffs**
**'Phone: Tipton 2448**

FOR DISPOSAL, unused Monorail Transporter and equipment, comprising 75 12 ft. rails, 16 6 ft. curved rails, one power waggon plus one trailer waggon, plus miscellaneous equipment for setting up system for conveyance. Original cost £3,000, best offers over £660. SPENCER BROS., 20 Chapel St., Liverpool, 3. Tel.: CENtral 5262.

BRAYSHAW Gas Fired Bale Out Furnace, complete in all respects including instrumentation.
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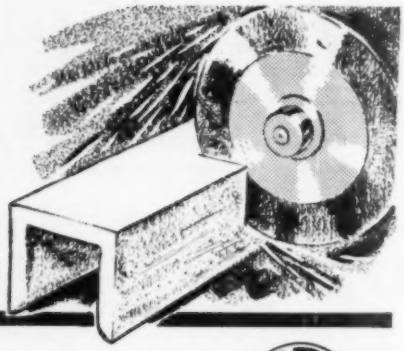

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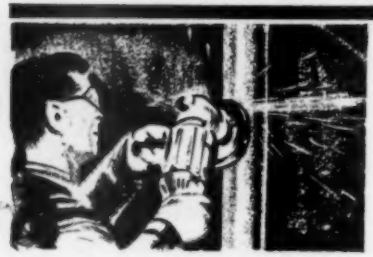

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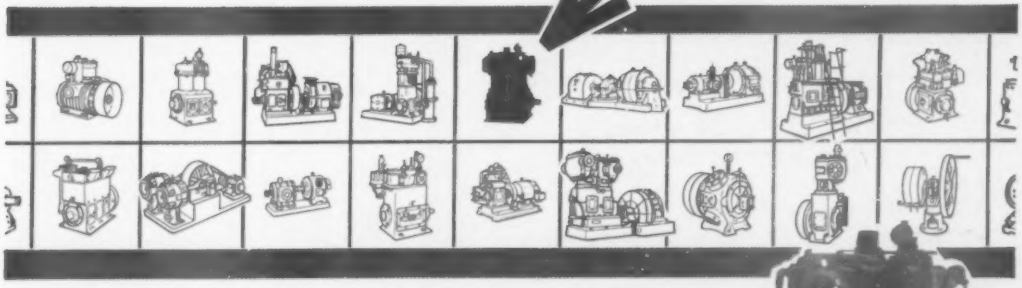

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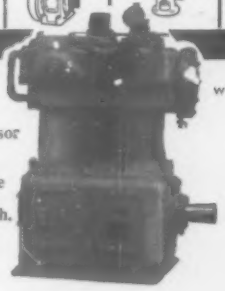

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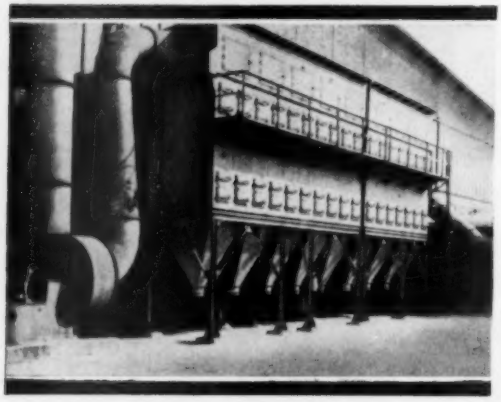

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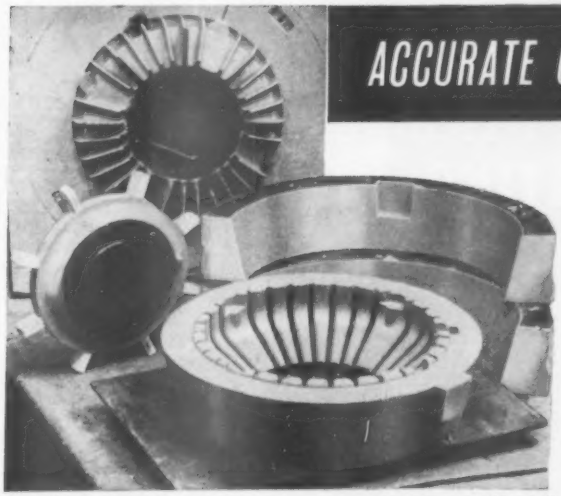

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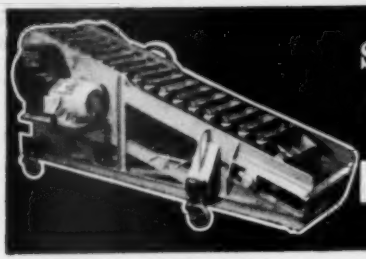

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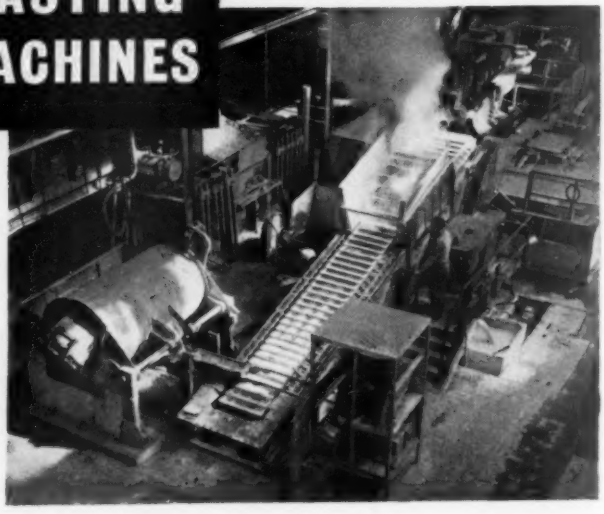

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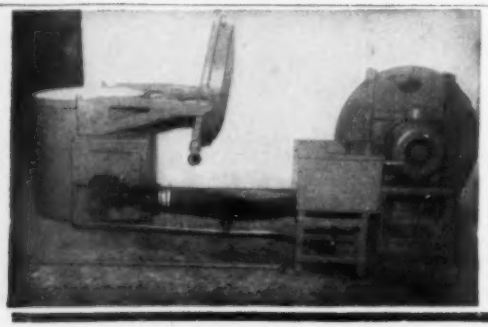

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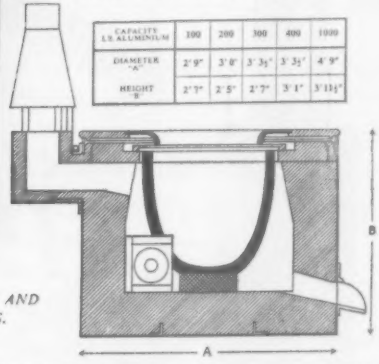


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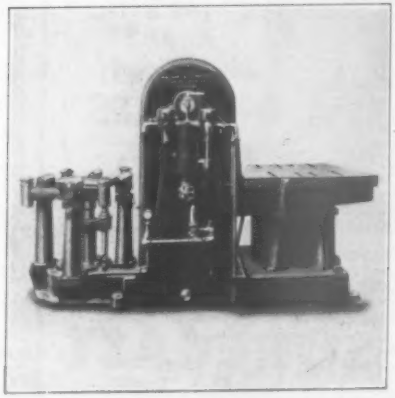

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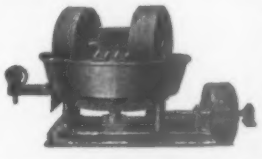

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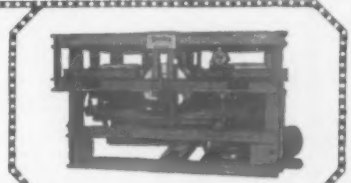

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| | PAGE NOS. |
|---|---|
| A.E.I.-Birlec, Ltd. | 46 |
| Acme Conveyors, Ltd. | — |
| Air Control Installations Ld. | 60 |
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| Aske, Wm., & Co., Ltd. | 4 |
| Ass. Lead Mfrs., Ltd. | 58 |
| Atlas Copco (G.B.), Ltd. | 93 |
| August's, Ltd. | 48 |
| Austin, E., & Sons, Ltd. | 37 |
| Badische Maschinenfabrik A.-G. | — |
| Bairds & Scottish Steel, Ltd. | — |
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| Birkett, F. W., & Co., Ltd. | 56 |
| Birlec-Efco (Melting), Ltd. | 12 |
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| Block & Anderson, Ltd. | — |
| Bloomer-Holt, Ltd. | — |
| Boydell, E., & Co., Ltd. | — |
| Bradbury, John, & Co. (Stockport), Ltd. | — |
| Bradley & Foster, Ltd. | — |
| British Acheson Electrodes, Ltd. | 17 |
| British Aero Components Ld. | 13 |
| British Electrical Repairs, Ltd. | — |
| British Foundry Units, Ltd. | 34 |
| British Industrial Sand Ltd. | 23 |
| British Iron & Steel Federation | — |
| British MonoRail, Ltd. | — |
| British Moulding Machine Co., Ltd. | 30,31 |
| British Oxygen Co., Ltd. | — |
| British Ronceray, Ltd. | — |
| British Shotblast & Engineering Co., Ltd. | 63 |
| Bromhead & Denison, Ltd. | — |
| Broom & Wade, Ltd. | 25 |
| Buckland Sand & Silica Co., Ltd. | — |
| Burn, John, & Co. (B'ham), Ltd. | — |
| Burnand, W. E., & Son, Ltd. | — |
| Canning, W., & Co., Ltd. | — |
| Carborundum Co., Ltd. | — |
| Catalin, Ltd. | — |
| Cawood Wharton & Co., Ltd. | 62 |
| Centrozap Foundry Machines | — |
| Chapman & Smith, Ltd. | — |
| Chemicals & Feeds, Ltd. | — |
| Chetham Timber Co., Ltd. | — |
| Churchill, Charles & Co., Ltd. | — |
| Ciba (A.R.L.), Ltd. | — |
| City Casting & Metal Co. Ltd. | — |
| Clayton Crane & Hoist Co. Ld. | 24 |
| Cleanair, Ltd. | 41 |
| Cohen, Geo. Sons & Co., Ltd. | 21 |
| Coleman-Wallwork Co., Ltd. | — |
| Combustion Chemicals, Ltd. | — |
| Comley, A., Ltd. | — |
| Consolidated Pneumatic Tool Co., Ltd. | — |
| Constructional Engineering Co., Ltd., The | 18 |
| Controlled Heat & Air, Ltd. | — |
| Conveyor & Shotblast, Ltd. | — |
| Cooke, Bailey, Ltd. | 54 |
| Cox & Danks, Ltd. | — |
| Crockett Lowe, Ltd. | 26 |
| Crooks, L. E. | 58 |
| Cumming, Wm., & Co., Ltd. | — |
| Cupodel, Ltd. | — |
| Dallow, Lambert & Co., Ltd. | — |
| Dickson, Roy Wilson Ltd. | — |
| Distillers Co., Ltd., The | — |
| Distington Engineering Co., Ltd. | — |
| Dowler, H. J., Engineers & Pattern Makers, Ltd. | 53 |
| Dowson & Mason, Ltd. | — |
| Dunford & Elliott, Ltd. | — |
| Durrans, James, & Sons, Ltd. | 28 |
| Dustraction | 63 |
| Dustuctor Co., Ltd. | — |
| Dyson, J. & J., Ltd. | — |
| Electrical Development Assoc. | — |
| Electrogenerators, Ltd. | — |
| Elliott, E. & C., Ltd. | — |
| Engineering Services (Manchester), Ltd. | — |
| Escol Products, Ltd. | 59 |
| Evans, James & Co., Ltd. | 62 |
| Evans, Roy, M.I.B.F. | — |
| Evans, Stanley N., Ltd. | — |
| Eyre Smelting Co., Ltd. | 56 |
| F. & M. Supplies, Ltd. | 91 |
| Feico Hoists, Ltd. | 6 |
| Filter-Heat, Ltd. | — |
| Fischer, George, Ltd. | — |
| Fisher-Foundries, Ltd. | — |
| Fletcher Miller, Ltd. | 59 |
| Flextol Engineering Co. Ltd. | — |
| Floodgate Steel Fabricating Co., Ltd. | — |
| Fordath Engineering Co., Ltd. | 32, 33 |
| Foundry Equipment Ltd. | 14, 15 |
| Foundry Mechanisations (Baillot), Ltd. | — |
| Foundry & Metallurgical Equipment Co., Ltd. | — |
| Foundry Plant & Machinery, Ltd. | 5 |
| Foundry Services, Ltd. | 42, 43 |
| Foundry Suppliers, Ltd. | — |
| Foxboro Yoxall, Ltd. | 40 |
| Frankiss R. J.(Patterns)Ltd. | — |
| Franklin Furnaces, Ltd. | 61 |
| Fringevision, Ltd. | — |
| Fuel & Metallurgical Processes, Ltd. | — |
| Fullers' Earth Union, Ltd., The | 65 |
| G.W.B. Furnaces, Ltd. | — |
| Gadd, Thos. | — |
| Gas Council | — |
| General Refractories, Ltd. | — |
| Gesellschaft für Hüttenwerksanlagan m.b.h. | — |
| Gilbert, G. & R. (Industrial), Ltd. | — |
| Gliksten, J., & Son, Ltd. | 57 |
| Goodyear Tyre & Rubber Co., Ltd. | — |
| Great Lakes Carbon International, Ltd. | — |
| Green, E., & Son, Ltd. | — |
| Green, Geo., & Co. | — |
| Gregory, J. G., & Sons, Ltd. | — |
| Griffiths, A. E. (Smethwick) Ltd. | — |
| Guest, Keen Iron & Steel Co., Ltd. | — |
| Guyson Industrial Equipment Ltd. | — |
| Harborough Construction Co., Ltd. | 38 |
| Hargraves Bros. (Manchester), Ltd. | — |
| Harris & Pearson, Ltd. | — |
| Harvey & Longstaffe, Ltd. | — |
| Harvey, J. J. & Pressurecast, Ltd. | 62 |
| Hatcham Rubber Co., Ltd. | — |
| Hed in, Ltd. | — |
| Heneage Metals, Ltd. | — |
| Hepburn Conveyor Co. Ltd. | 36 |
| Heywood, S. H., & Co., Ltd. | — |
| High Speed Steel Alloys, Ltd. | — |
| Hills (West Bromwich), Ltd. | — |
| Holman Bros., Ltd. | — |
| Holmes, W. C., & Co., Ltd. | 10 |
| Holroyd & Hall, Ltd. | 54 |
| Hooker, W. J., Ltd. | — |
| Hunt, F. L., Ltd. | — |
| I.C.I. (Billingham Division), Ltd. | — |
| I.C.I. (Plastics Division), Ltd. | — |
| Ilford, Ltd. | 39 |
| Impregnated Diamond Products, Ltd. | — |
| Incandescent Heat Co., Ltd. | — |
| Ingersoll-Rand Co., Ltd. | — |
| Jackman, J. W., & Co., Ltd. | — |
| Jacks, Wm., & Co., Ltd. | 49 |
| Joy-Sullivan, Ltd. | — |
| Keith Blackman, Ltd. | 35 |
| Kenilworth Mfg. Co., Ltd. | — |
| King, Geo. W., Ltd. | — |
| Lafarge Aluminous Cement Co., Ltd. | — |
| Laidlaw, Drew & Co., Ltd. | — |
| Lazarus, Leopold, Ltd. | — |
| Leicester Lovell & Co., Ltd. | — |
| Levy, B., & Co. (Patterns), Ltd. | 54 |
| L.M.S. Products, Ltd. | — |
| Lones, Joseph Laboratories | — |
| Lord, E. S., Ltd. | — |
| Luke & Spencer, Ltd. | — |
| Macnab & Co., Ltd. | 61 |
| Major, Robinson & Co., Ltd. | — |
| Mansfield Standard Sand Co., Ltd. | 44 |
| Marco Conveyor & Engineering Co., Ltd. | 16 |
| Mathison, John, Ltd. | — |
| Matthews & Yates, Ltd. | — |
| May, J. H., Ltd. | — |
| McKechnie Bros., Ltd. | — |
| Metalectric Furnaces, Ltd. | — |
| Metalline Cement Co., The | — |
| Metals & Equipment (Wolverhampton), Ltd. | — |
| Midgley & Son, Ltd. | — |
| Midland Monolithic Furnace Lining Co., Ltd. | 63 |
| Mine Safety Appliances, Ltd. | — |
| Modern Furnaces & Stoves, Ltd. | 20 |
| Molineux Foundry Equipment, Ltd. | — |
| Monometer Manufacturing Co., Ltd. | 11 |
| Mond Nickel Co., Ltd. | — |
| Morgan Crucible Co., Ltd. | — |
| Morris, B. O., Ltd. | — |
| Morris, H., Ltd. | — |
| Moyle, Victor & Co., Ltd. | — |
| Muir, Murray & Co., Ltd. | — |
| Newton Collins, Ltd. | 55 |
| Newman Hender & Co., Ltd. | — |
| Nicholl & Wood, Ltd. | — |
| Norris Equipment & Construction, Ltd. | 60 |
| Nundy Marine Metals, Ltd. | — |
| Ormerod, R. E., Ltd. | 63 |
| Palmer Aero Products, Ltd. | — |
| Parish, J., & Co., Ltd. | 1 |
| Park & Paterson, Ltd. | — |
| Parker Mitchell Engineering Co., Ltd. | — |
| Passe, J. F., & Co. | — |
| Paterson Hughes Engineering Co., Ltd. | — |
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| Pneulec, Ltd. | 7 |
| Podmore, W., & Sons, Ltd. | — |
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| Polygram Castings Co., Ltd. | 19 |
| Precision Presswork Co., Ltd. | — |
| Price, J. T., & Co., Ltd. | — |
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| Purimachos, Ltd. | 62 |
| Rapid Magnetic, Ltd. | — |
| Reavell & Co., Ltd. | 57 |
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| Reid, Wm., & Co. | — |
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| Ridsdale & Co., Ltd. | — |
| Riley (IC) Products, Ltd. | — |
| Robson Refractories, Ltd. | — |
| Roper, E. A., & Co., Ltd. | 8 |
| Rowland, F. E., & Co., Ltd. | 27 |
| Rownson (Conveyors), Ltd. | — |
| Rubery Owen & Co., Ltd. | — |
| Rule & Moffat | — |
| Rustless Iron Co., Ltd. | 44 |
| Safety Products, Ltd. | — |
| Salter, Geo., & Co., Ltd. | — |
| Schleidrop & Co., Ltd. | — |
| St. George's Engineers, Ltd. | — |
| Sheffield Smelting Co., Ltd. | 9 |
| Shell Chemical Co., Ltd. | — |
| Sheppard & Co., Ltd. | 60 |
| Sinex Eng'g. Co., Ltd. | — |
| Sintokogio, Ltd. | — |
| Sklenar Furnaces, Ltd. | — |
| Smedley Bros., Ltd. | 63 |
| Smeeton, J. A., Ltd. | — |
| Smith, A., & Co. | 63 |
| Smith, A. (S. & B. Foundry Sands), Ltd. | — |
| Smith, John (Keighley), Ltd. | — |
| Sommerfield, H. G., Ltd. | — |
| Spencer & Halstead, Ltd. | — |
| Spermolin, Ltd. | 3 |
| Stansby, W., & Co., Ltd. | — |
| Stanton Ironworks Co., Ltd., The | 29 |
| Staveley Iron & Chemical Co., Ltd. | — |
| Steels Engineering Installations | — |
| Stein, John G., & Co., Ltd. | — |
| Stephens, Wm., & Sons, Ltd. | — |
| Sterling Foundry Specialties, Ltd. | 2 |
| Sternol, Ltd. | — |
| Suffolk Iron Foundry (1920), Ltd. | — |
| Tallis, E., & Sons, Ltd. | — |
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| Wadkin, Ltd. | — |
| Wal-Met Alloys Co. | — |
| Walker, I. & I., Ltd. | — |
| Walsh Bros. | — |
| Ward, Thos. W., Ltd. | 66 |
| Waring Bros. | — |
| Warner & Co., Ltd. | — |
| Watsons (Metallurgists), Ltd. | — |
| Webster & Co. (Sheffield) Ltd. | — |
| West Midland Refining Co., Ltd. | 22 |
| Whitecross Co., Ltd. | — |
| Wild-Barfield Electric Furnaces, Ltd. | — |
| Wilkinson Rubber-Linatex Co., Ltd. | — |
| Wilson, T. S., & Co. (Graphite), Ltd. | — |
| Witham, L. A., & Co. | — |
| Woking Pattern Works, Ltd. | — |
| Woodward Bros. & Copelin, Ltd. | — |


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